

**Appendix A**  
**Permit Application**



April 14, 2005

J200.40142

Mr. Dolan Dunn  
USACE – Galveston District  
P. O. Box 1229  
Galveston, Texas 77553-1229

**RE: PERMIT APPLICATION TO WIDEN PORTIONS OF FREEPORT  
HARBOR JETTY AND ENTRANCE CHANNEL USING NON-FEDERAL  
FUNDS**

Dear Mr. Dunn:

**I. EXECUTIVE SUMMARY**

- **The Brazos River Harbor Navigation District of Brazoria County, Texas (also known as Port Freeport) is seeking a USACE Section 10/404 permit to widen portions of the Entrance and Jetty Channel of the Freeport Harbor Channel by up to 200 feet (from 400 feet up to 600 feet). The project depth will remain the same at 45 feet in the Jetty Channel and 47 feet in the Entrance Channel.**
- **The PURPOSE of the proposed project is to widen the channel to eliminate existing operational constraints that include (a) one-way traffic, (b) daylight operations only for larger vessels, and (c) restrictions that do not allow the larger vessels requiring waivers to enter port when winds exceed 20 knots or cross-currents exceed 0.5 knots.**
- **The project NEED is the elimination of the operational constraints to allow vessels to avoid delays, thereby reducing shipping costs and logistical problems.**
- **The goal is to have the widening complete during 2007.**
- **The applicant intends to seek federal assumption of maintenance if permitted and constructed as a non-federal improvement.**
- **The widening will generate approximately 2 million CY of uncontaminated material, predominantly clay/silty clay and sand/sandy silt. The material will be used for two beneficial purposes: (a) creation of an offshore berm to provide a topographic high with hard substance; and (b) beach nourishment.**
- **All work will be done in compliance with design standards applicable to federal projects in order to be consistent with any results from the ongoing, congressionally authorized federal feasibility study for widening and deepening all major segments of the Freeport Harbor Channel.**
- **Preliminary analyses of key issues have not identified any significant negative impacts or serious concerns. These include jetty stability, cultural resources, dredging, sediment quality, dredged material placement, water quality, endangered species, etc.**

## **II. EXISTING CONDITIONS**

### **II.1 Existing Project Dimensions**

The existing Freeport Harbor Channel consists of the following authorized components:

Entrance Channel .....	47 ft x 400 ft
Jetty Channel .....	47 ft x 400 ft
Lower Turning Basin .....	45 ft x 750 ft
Inside Channel.....	45 ft x width varies
Brazosport Turning Basin .....	45 ft x 1,000 ft
Upper Turning Basin.....	45 ft x 1,200 ft
Brazos Harbor Channel .....	36 ft x 200 ft
Brazos Harbor Turning Basin .....	36 ft x 750 ft

These channel reaches normally have an advance maintenance component and an over dredge allowance in addition to the authorized depths. The proposed widening will affect only the Entrance Channel and the Jetty Channel.

### **II.2 Operational Constraints Resulting from Existing Channel Dimensions**

The widening will allow deep draft vessels to enter port under a broader range of environmental conditions than is possible in the 400-foot channel. At present, all deep draft vessels are limited to one-way traffic in the Freeport Channel. Vessels over 750 feet long or over 107 feet wide – which includes most crude oil and chemical tankers, the largest segment of Freeport traffic – are also limited to daylight transits. Vessels with beams over 145 feet are further limited and require waivers to enter port.

Port entry is further restricted by the effects of along-shore cross-currents, which vary in direction and velocity up to 3 knots. Depending on the ship's speed and the current's velocity, the Harbor Pilot must apply as much as 14 degrees of rudder "leeway" to counter the cross-current effects. That "crabbing" approach has the ship at an angle to the centerline of the channel as it approaches the jetties, which makes its effective width in the channel greater than the vessel's beam. A cross-current strong enough to restrict entrance for deep-draft vessels occurs approximately five percent of the time. For the largest vessels, entrance could be restricted as much as 25 to 30 percent of the time. The cross-current affects maneuverability as the vessel starts into the jetties and the effects are no longer uniform. Widening the channel would reduce the effects of cross-current by allowing for a wider beam aspect approaching the jetties and providing more room to maneuver in the Jetty Channel. Widening the channel would also allow longer vessels to enter Port Freeport, since the vessel's beam aspect is influenced by length as well as width and amount of leeway being held.

For the most part, the largest tankers currently able to call at the Seaway and ConocoPhillips terminals are AFRAMAX size – 75,000 to 110,000 deadweight tons

(DWT), with the largest on the order of 800 feet long and 138 feet wide. The terminal operators would like to be able to accommodate the larger SUEZMAX tankers – 110,000 to 150,000 DWT, with typical dimensions on the order of 900 feet long and 148 feet wide. Under current conditions, those larger vessels can enter the port only under ideal weather and sea conditions after undergoing the Port’s waiver process. Widening the channel would substantially increase the operating window for those larger tankers. For many of the smaller deep draft vessels, widening would also allow for relaxation of the existing requirements for one-way traffic and daylight transits.

These substantial benefits for widening are reflected in the USACE’s “Freeport Harbor, Texas, Navigation Improvement Reconnaissance Report Section 905(b) Analysis (October 2002)”. That report states that widening will result in direct transportation cost savings for existing and future vessel and terminal operators in several ways. One of benefits of widening is decreased vessel downtime associated with the ‘daylight hours only’ transit restriction for vessels in excess of 750 feet in length. Another is decreased vessel downtime associated with one-way traffic restrictions for deep draft vessels – deep draft crude carriers represent the majority of the 3,000+ vessels calling annually. Reducing constraints based on the effects of along-shore cross-currents is another significant benefit stated in the report. Widening will also improve the potential for much larger vessels to enter port. The study notes that waivers have been granted for vessels up to 900 feet long and 160 feet wide, when wind is below 15 knots and cross-current is not more than one-half knot, and that numerous requests have been denied for ships 920 to 950 feet long.

Some benefits will also be achieved in the form of improved navigation safety as a result of the increased maneuvering room, especially between the jetties. Also, a widened channel will be less restrictive for other traffic during maintenance dredging and when the other improvements are initiated in the future.

### II.3 Activity and Trends at Port Freeport

Total tonnage through the Port has steadily and consistently increased over the past ten years as indicated below. Crude oil represented approximately two-thirds of the total tonnage in 2003. Trends for 2004 and 2005 are consistent with the pattern shown by these statistics.

<b>Cargo Through Port Freeport (thousand short tons)</b>			
<b>Year</b>	<b>Total</b>	<b>Year</b>	<b>Total</b>
1994	17,450	1999	28,076
1995	19,662	2000	28,966
1996	24,571	2001	30,143
1997	26,281	2002	27,164
1998	29,014	2003	30,537

Given national and international trends, the growth over the last decade is expected to continue in the future. In addition to the growth in existing cargos, there are several

recent new initiatives in the area that will contribute to even more growth. These include the following:

- **Container / General Cargo Diversification.** The Port has initiated a major diversification effort aimed at a wide range of new cargos. This has included (a) a master planning project to assess potential uses for the Port's 8,000± acres, (b) permitting and design of the first phase of a modern container terminal, and (c) other initiatives.
- **LNG Terminal.** Freeport LNG recently received Federal Energy Regulatory Commission (FERC) and USACE approvals for an LNG terminal at Quintana. As currently permitted, the terminal will have one berth and a throughput capacity of 1.5 bcf/d and will generate one ship call every 3 days. While no application for expansion has been filed, Freeport LNG has notified FERC that the plans for expansion include a second berth and additional storage.

Increased ship traffic resulting both from growth of existing business and from new business will increase the operational congestion on the existing system. The proposed widening of the Entrance Channel and Jetty Channel up to 600 feet will significantly lessen the congestion by removing most of the operational constraints.

#### **II.4 Ongoing Federal Feasibility Study**

The USACE, under the authority of Section 216 of the Flood Control Act of 1970 (P.L. 91-611), is currently conducting a feasibility study for widening and deepening the Freeport Harbor Channel. This study will evaluate the incremental widening and deepening of the project up to dimensions of 600 feet by 60 feet. The \$5.4 million study is being jointly funded by the USACE and Port Freeport.

The timing of the feasibility study and subsequent authorization and appropriations are dependent upon the federal budget process. A current optimistic view indicates that the federal project could be online in the 2012 timeframe.

Local interests hope to have the widening permitted and constructed by late 2007. All design features of the improvements will be done in strict compliance with USACE design standards for federal projects to ensure compatibility.

### **III. THE CASE FOR CHANNEL EXPANSION**

#### **III.1 Introduction**

There is a widely recognized need to expand the Freeport Harbor Channel. The 2002 USACE Reconnaissance Study (Freeport Harbor, Texas Navigation Improvement Reconnaissance Report, Section 905(b) Analysis) stated the need to improve the existing conditions.

*"The existing conditions that give rise to the need for channel enlargements at Freeport Harbor are the existing channel dimensions, which are inadequate for the length and draft of many of the crude petroleum and chemical tankers operating at Freeport. As a result of channel constrictions, operational practices have been instituted that result in light loading and additional transit times at Freeport Harbor."*

The Port is keenly aware of the need to both widen and deepen the channel, which is being evaluated in the ongoing federal feasibility study. The Port, in cooperation with Port Users, has opted to pursue obtaining a permit to widen the Jetty Channel and Entrance Channel from 400 feet up to 600 feet in order to expedite the substantial benefits of widening, with a target completion date in 2007. This permit action should allow the widened channel to be in operation at least 5 years earlier than the proposed federal improvements.

The decision to expeditiously pursue the widening alone in lieu of the deepening is based on several factors; namely, widening will (a) relieve serious operational constraints, (b) benefit the largest number of shippers, and (c) be substantially less costly.

### **III.2 Purpose and Need**

The purpose and need for the widening can be succinctly stated.

- The purpose of the proposed project is to widen the channel to eliminate existing operational constraints that include (a) one-way traffic, (b) daylight transit only of the larger vessels, and (c) restrictions that do not allow large ships requiring waivers to operate when winds exceed 20 knots or cross-currents exceed 0.5 knots.
- The project need is the elimination of the operational constraints, allowing vessels to avoid delays, thereby reduce shipping costs and logistical problems.

## **IV. RELATED ISSUES**

Preliminary coordination with the USACE and resource agencies, prior studies of channel expansion, and discussions with users have identified a number of issues that merit attention when considering channel widening. Following is a brief discussion of the primary issues. In some cases, the applicant did a detailed study of the specific topic. These are available as appendices.

### **IV.1 Jetty Stability**

There was concern that widening the channel by up to 200 feet might undermine the jetties and make them unstable. A study was commissioned that included obtaining additional soil borings and conducting a detailed engineering study of the jetty's stability for a widened channel. The study showed that the jetty stability would not be jeopardized by the proposed widening. That portion of the jetty channel beyond the beach that has a

full jetty can be widened to 600 feet without any risk to the jetty's stability. The inner portion that consists of a heavy revetment along the shoreline can be widened to 550 feet without any risk. Thus, that portion of the channel from station 0+00 to station 43+00 will be widened to 600 feet. Station 43+00 to station 38+00 will be a transition zone with the remaining distance to the Lower Turning Basin (station 38+00 to station 51+84) being widened to 550 feet (Geotechnical Study of Jetty Stability and Channel Widening Project, Freeport Ship Channel, Freeport, Texas; Fugro Consulting, April 2005).

#### **IV.2 Beneficial Use of Dredged Material**

The channel widening to 600 feet will generate approximately 2.8 million CY of new material. This is all virgin cut material and consists of 1.2 million CY of clay/silty clay and 0.8 million CY of sand/silty sand (Geotechnical Study of Jetty Stability and Channel Widening Project, Freeport Ship Channel, Freeport, Texas; Fugro Consulting, April 2005). These findings are consistent with prior USACE geotechnical investigations.

The primary beneficial use of the dredged material is to create a topographic high in the form of a berm. It will be built approximately 2.5 miles off the Quintana Beach in 40± feet of water. There is adequate dredged material to build a berm approximately 8,000 feet long by 2,000± feet wide including slopes, to a height of 15 feet.

The primary benefit of the berm will be to fisheries in the form of a topographic high and relatively hard substrate in an area that is very flat and has very soft bottom conditions. A second, and relatively minor, benefit is that the berm may offer some storm protection to a portion of the eroding Quintana Beach during a moderate hurricane.

The dredging is expected to produce approximately 300,000± CY of material that can be used for beach nourishment. To the extent that it can be economically recovered, it will be placed on the beach at Quintana. While not ideal for beach nourishment, approximately 300,000 CY of comparable virgin cut beach quality material was placed on Surfside Beach during the Freeport Harbor 45-Foot Project in the early 1990s with broad public acceptance.

Dredging will be done by pipeline dredge or a mix of pipeline and hopper dredges. Given the current status of the U.S. dredging industry, this flexibility is needed to get the best bid prices. It is likely that a pipeline dredge will be used in the Jetty Reach and a hopper dredge in the Entrance Reach; however, dredging contractors have indicated that a pipeline dredge might be used for both reaches.

#### **IV.3 Cultural Resources**

The primary area of potential concern is the 200-foot increment that the channel will be widened. A marine archeological investigation is currently underway. It has been coordinated with USACE archaeologists and is being done to meet applicable USACE standards. The results will be provided to the Galveston District when they are available.

#### **IV.4 Threatened and Endangered Species**

The primary endangered species of concern is sea turtles. Dredging protocols have been developed and agreed to for all USACE hopper dredging projects within the Freeport Channel. These same protocols will be applied to the non-federal widening.

#### **IV.5 Water Quality**

Sediment samples from borings were subjected to a range of chemical testing to applicable USACE and EPA protocols. The results were then reviewed against the applicable criteria with the results being that no contamination was found that exceeded screening criteria. Consequently, the material meets all criteria for open water placement or for beach nourishment. (Letter Report; PBS&J, Martin E. Arhelger, April 2005)

All reasonable efforts will be made to control sediment dispersion during construction of the berm. This will include (a) control of the dredging operations to maximize generation of clay balls and minimize liquid content, (b) placement of an outfall pipe with deflectors near the bottom, and (c) use of submerged silt curtains around the discharge location.

#### **IV.6 Air Quality**

The dredging and placement of approximately 2 million CY will be done over a 4-5 month period. Based on current technology, this will probably generate over 25 tons of NO<sub>x</sub> and VOC, thus requiring a Conformity Analysis Review under the Clean Air Act. Once completed, the widening will eliminate significant ship waiting time and associated emissions.

An analysis is currently underway to determine the emissions during dredging and verify that a Conformity Analysis will be required. The same effort is also assessing the potential reduction in ship-related emissions that will result from a decrease in waiting time.

#### **IV.7 Recreation**

The Freeport Harbor Channel is widely recognized as a valuable recreational asset that provides small boat access to the Gulf, fishing from the jetties and shoreline, and the opportunity to watch ships from up close. The proposed widening should not negatively impact any of these uses. Potential recreational benefits include improved fishing on the offshore berm and expansion of eroding beaches due to beach nourishment.

#### **IV.8 Cumulative Impacts**

The proposed widening is not expected to generate an increase in total ship traffic calling at Freeport. Rather, the widening will remove existing operating constraints, thereby

increasing the efficiency of existing operations. Thus, the widening should have no cumulative impacts.

## V. CLOSING

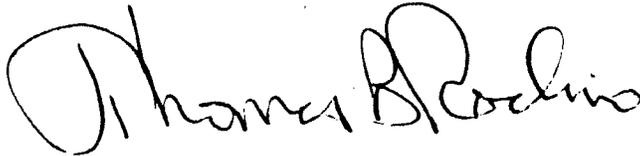
Attached you will find a completed application (USACE form 4345), permit drawings (eight sheets), and supporting information.

We are submitting this application on behalf of the applicant, the Brazos River Harbor Navigation District of Brazoria County, Texas, as authorized on page 1 of the application form.

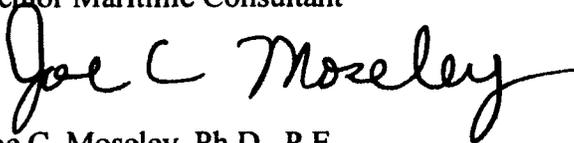
We are requesting that you review this application package as expeditiously as practical. Please contact the undersigned if you need any clarification or additional information.

Sincerely,

SHINER MOSELEY AND ASSOCIATES, INC.



Captain Thomas B. Rodino (USCG Retired)  
Senior Maritime Consultant



Joe C. Moseley, Ph.D., P.E.  
Principal

JCM/dd

Enclosures

cc with Enclosures: Brazos River Harbor Navigation District (David Knuckey, P.E.)

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT  
(33 CFR 325)

OMB APPROVAL NO. 0710-0003  
Expires December 31, 2004

The public reporting burden for this collection of information is estimated to average 10 hours per response, although the majority of applications should require 5 hours or less. This includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302; and to the office of Management and Budget, Paperwork Reduction Project (0710-0003), Washington DC 20503. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies. Submission of requested information is voluntary, however, if information is not provided, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETED
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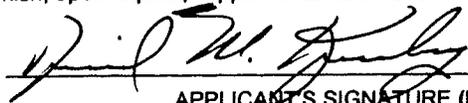
(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME Brazos River Harbor Navigation District	8. AUTHORIZED AGENT'S NAME AND TITLE (an agent is not required) Joe C. Moseley, Ph.D., P.E., Vice President
6. APPLICANT'S ADDRESS P.O. Box 615 Freeport, TX 77542-0615	9. AGENT'S ADDRESS Shiner Moseley and Associates, Inc 555 N. Carancahua, Suite 1650 Corpus Christi, Texas 78478
7. APPLICANT'S PHONE NUMBERS WITH AREA CODE a. Residence b. Business 979-233-2667, ext. 4257	10. AGENT'S PHONE NUMBERS WITH AREA CODE a. Residence b. Business 361-857-2211

11.

STATEMENT OF AUTHORIZATION

I hereby authorize Shiner Moseley and Associates, Inc. to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

  
APPLICANT'S SIGNATURE (David M. Knuckey, P.E.)

4/14/05  
DATE

NAME, LOCATION AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions) Widening of the Freeport Ship Harbor Jetty and Entrance Channel	
13. NAME OF WATERBODY, IF KNOWN (if applicable) Gulf of Mexico	14. PROJECT STREET ADDRESS (if applicable) N/A
15. LOCATION OF PROJECT Brazoria COUNTY Texas STATE	

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)  
N/A

17. DIRECTIONS TO THE SITE  
Proceed south from Lake Jackson on SH 332; cross the Gulf Intracoastal Waterway. Turn right at stop light and proceed to end of street that dead-ends at the Ship Channel.

18. Nature of Activity (Description of project, include all features)

- Dredge channel to a maximum bottom width of 600 ft from the Lower Turning Basin to the -51 ft contour, a distance of approximately 4.8 miles.
- Dredging will be performed primarily with pipeline dredge; with the possible use of some hopper dredge.

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

The purpose of the proposed project is to widen the channel to eliminate existing operational constraints that include (a) one-way traffic, (b) daylight operations only for larger vessels, and (c) restrictions that do not allow large vessels requiring waivers to enter port when winds exceed 20 knots or cross-currents exceed 0.5 knots.

**USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED**

20. Reason(s) for Discharge

Provide beneficial uses: (a) create a berm to provide a topographic high and hard substrate (for habitat and beach protection) and (b) put sand on beach for beach nourishment.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards

Clay / silty clay ..... 1,200,000 CY  
 Sand / sandy silt ..... 800,000 CY  
 Total ..... 2,000,000 CY

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

- (a) Offshore berm ..... < 370 acres (including slopes)
- (b) Beach nourishment ..... < 10 acres of new beach area at initial equilibrium

23. Is Any Portion of the Work Already Complete? Yes  No  IF YES, DESCRIBE THE COMPLETED WORK

24. Addresses of Adjoining Property Owners, Lessees, etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list).

See Sheet 8 of attached permit drawings.

25. List of Other Certifications or Approvals/Denials Received from other Federal, State, or Local Agencies for Work Described in This Application

AGENCY	TYPE APPROVAL *	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
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\* Would include but is not restricted to zoning, building and flood plain permits

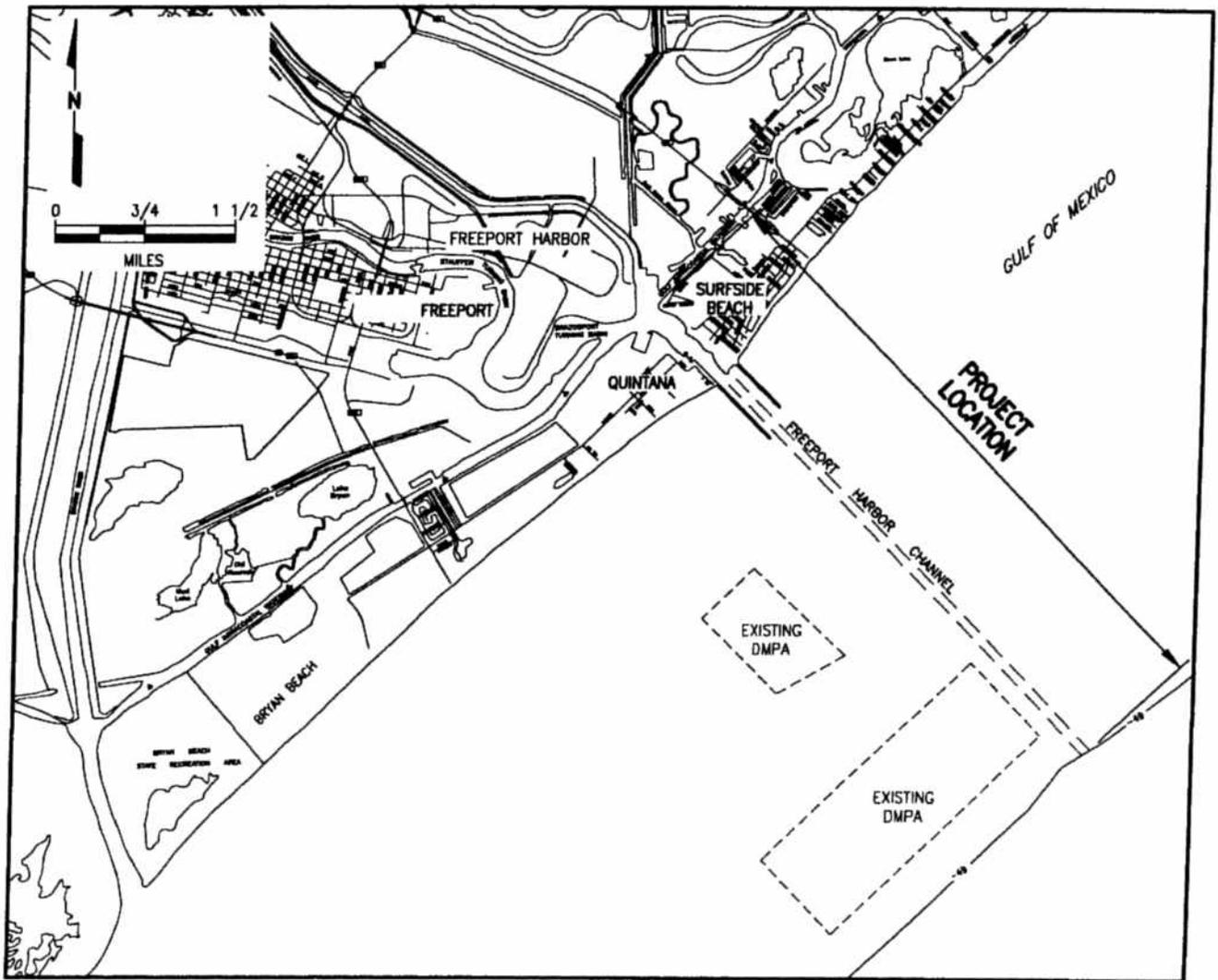
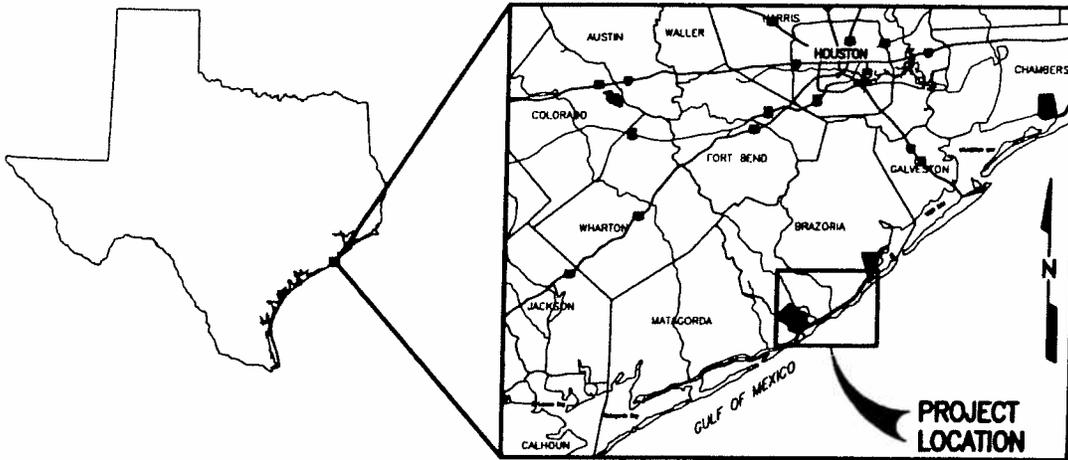
26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

N/A	N/A		4/14/05
SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT – <del>Shiner</del> Moseley	DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in Block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States, knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than \$10,000 or imprisoned not more than five years or both.

# PROJECT LOCATION



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FOR COE USE ONLY  
 Permit Application No.: \_\_\_\_\_

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT

COUNTY: BRAZORIA

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

**SM** SHINER MOSELEY AND ASSOCIATES, INC.  
 ENGINEERS & CONSULTANTS  
 555 North Carancahua Street, Suite 1650 Corpus Christi, Texas 78478

DATE: 4/15/05

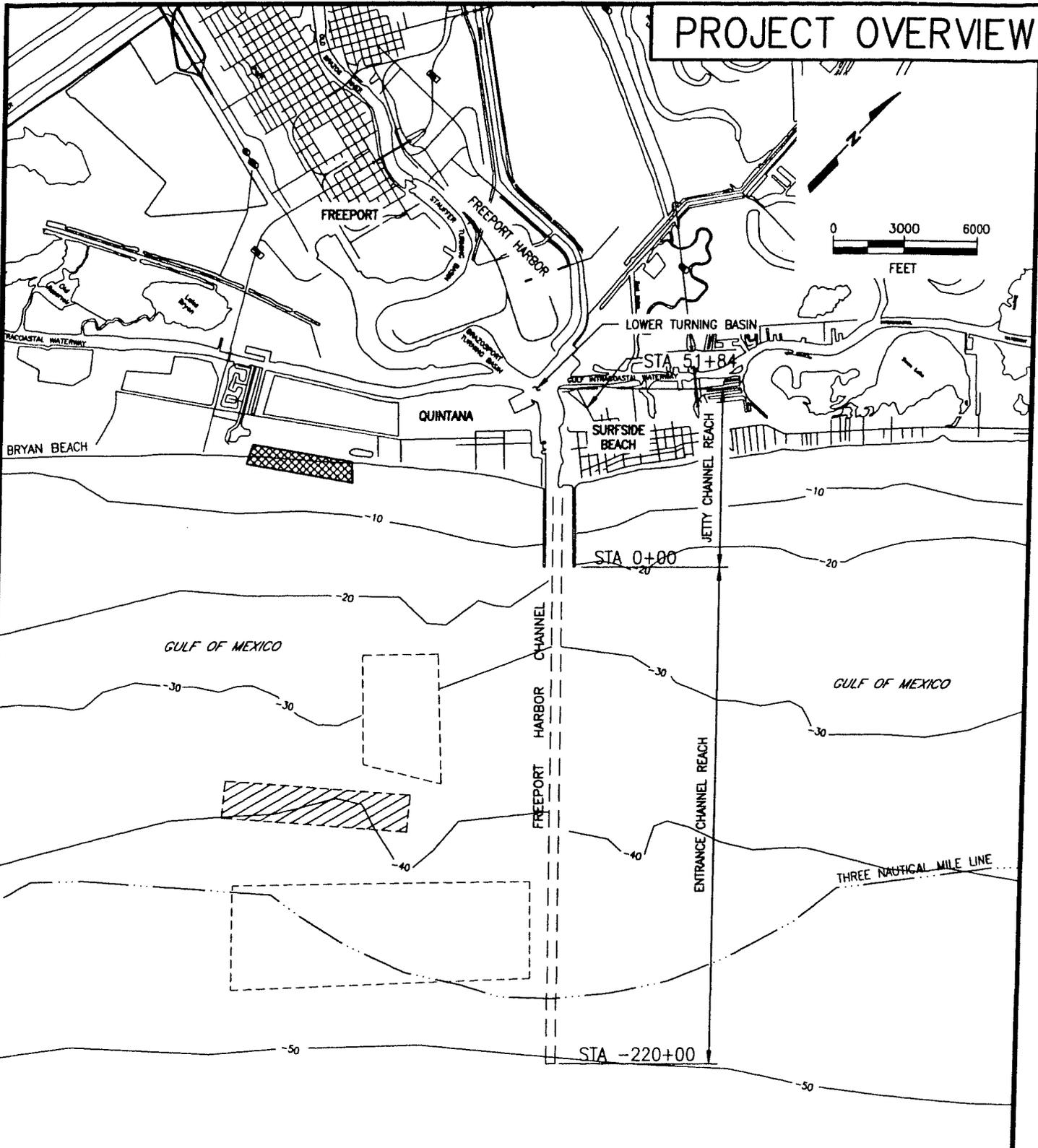
REV. DATE:

DATUM: USACE MLT

PROJECT No: 200.40142.00

SHEET 1 of 8

# PROJECT OVERVIEW



**LEGEND:**

-  PROPOSED NEW BENEFICIAL USE AREA: BERM FOR HABITAT
-  PROPOSED BEACH NOURISHMENT AS BENEFICIAL USE
-  EXISTING USACE DMPA



FOR COE USE ONLY

Permit Application No.:

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT COUNTY: BRAZORIA

 SHINER MOSELEY AND ASSOCIATES, INC. ENGINEERS & CONSULTANTS

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

555 North Carancahous Street, Suite 1650 Corpus Christi, Texas 78478

DATE: 4/15/05

REV. DATE:

DATUM: USACE MLT

PROJECT No: 200.40142.00

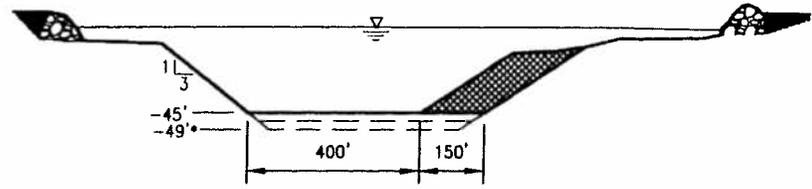
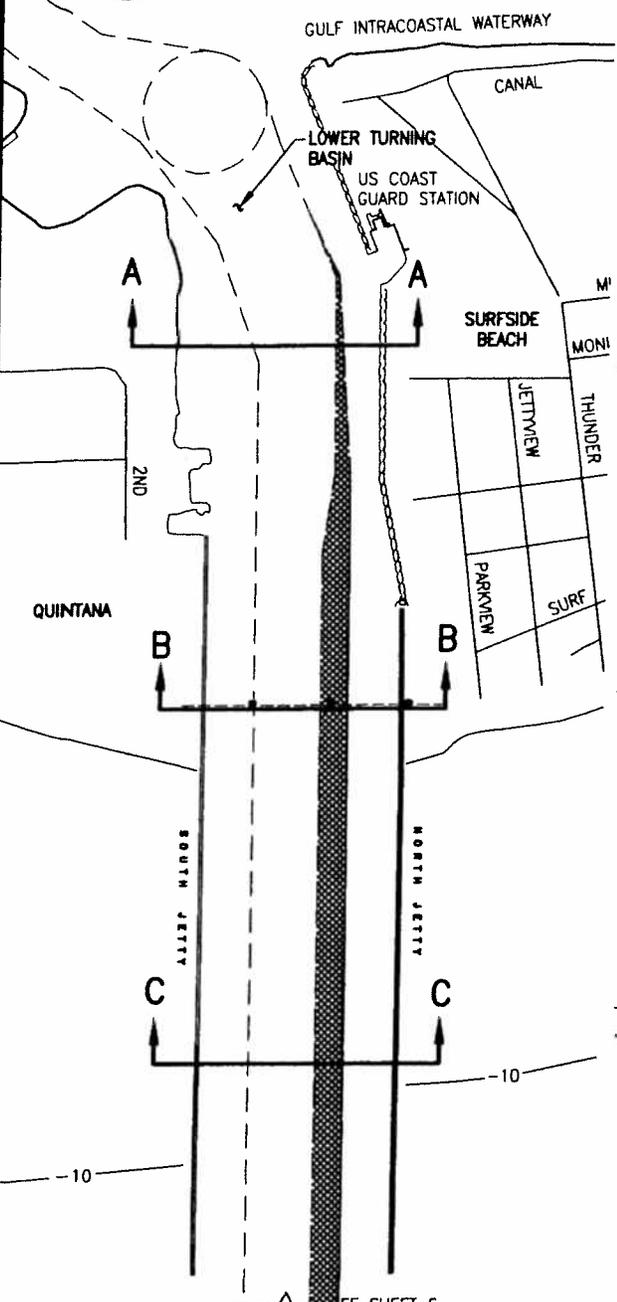
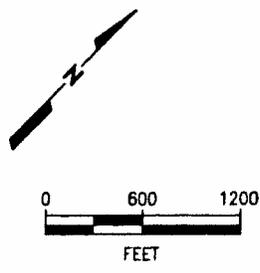
SHEET 2 of 8

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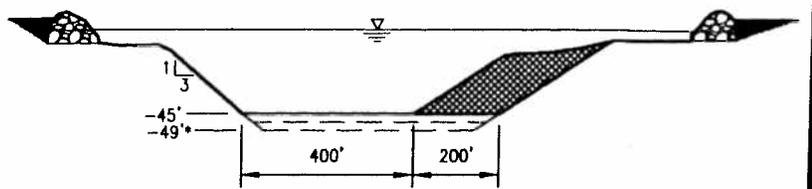
# PRELIMINARY DRAFT

## JETTY CHANNEL REACH

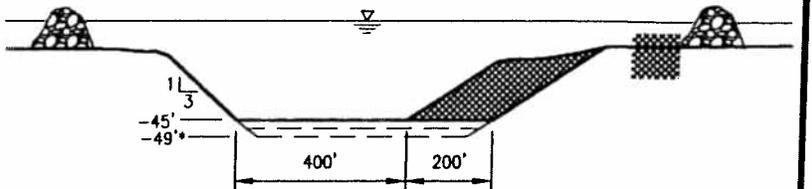
 PROPOSED DREDGE INCREMENT



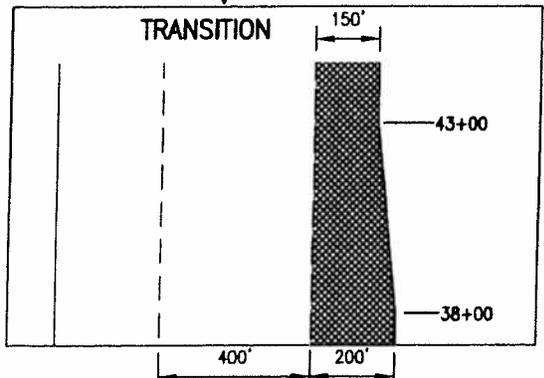
**SECTION A-A**



**SECTION B-B**



**SECTION C-C**



**NOTES:**

\* INCLUDES 2' OF MAINTENANCE PLUS 2' OF OVERDREDGE

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FOR COE USE ONLY

Permit Application No.:

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT COUNTY: BRAZORIA

 SHINER MOSELEY AND ASSOCIATES, INC. ENGINEERS & CONSULTANTS  
555 North Carancahua Street, Suite 1650 Corpus Christi, Texas 78478

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

DATE: 4/15/05

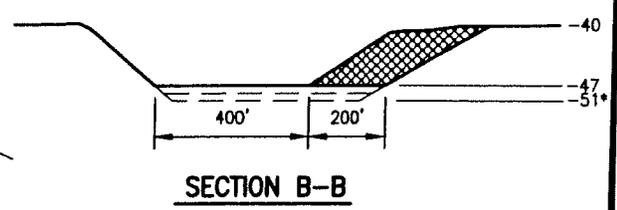
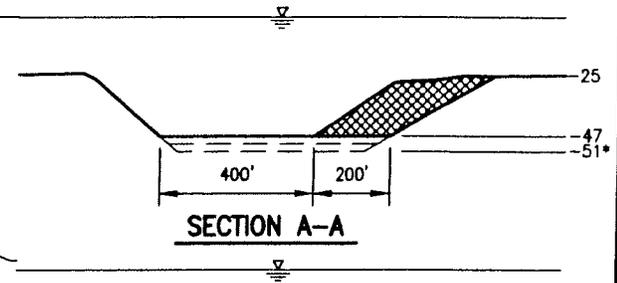
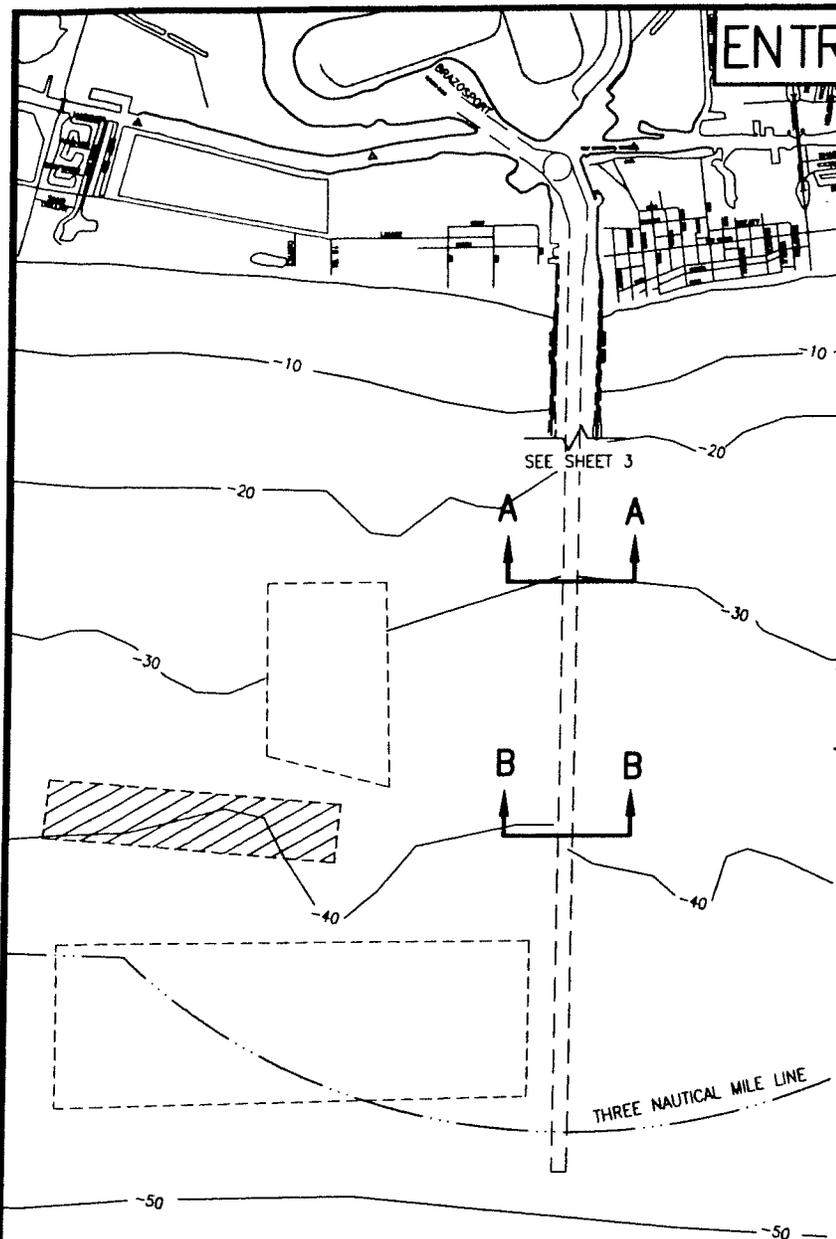
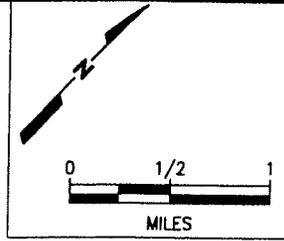
REV. DATE:

DATUM: USACE MLT

PROJECT No: 200.40142.00

SHEET 3 of 8

# ENTRANCE CHANNEL REACH



**NOTES:**

\* INCLUDES 2' OF MAINTENANCE PLUS 2' OF OVERDREDGE

**LEGEND:**

- PROPOSED DREDGE INCREMENT
- PROPOSED NEW BENEFICIAL USE AREA: BERM FOR HABITAT
- PROPOSED BEACH NOURISHMENT AS BENEFICIAL USE (SEE SHEET 7)
- EXISTING USACE DMPA



FOR COE USE ONLY

Permit Application No.: \_\_\_\_\_

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT      COUNTY: BRAZORIA

**SHINER MOSELEY AND ASSOCIATES, INC.**  
ENGINEERS & CONSULTANTS  
553 North Caracaboa Street, Suite 1650 Corpus Christi, Texas 78478

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

DATE: 4/15/05

REV. DATE:

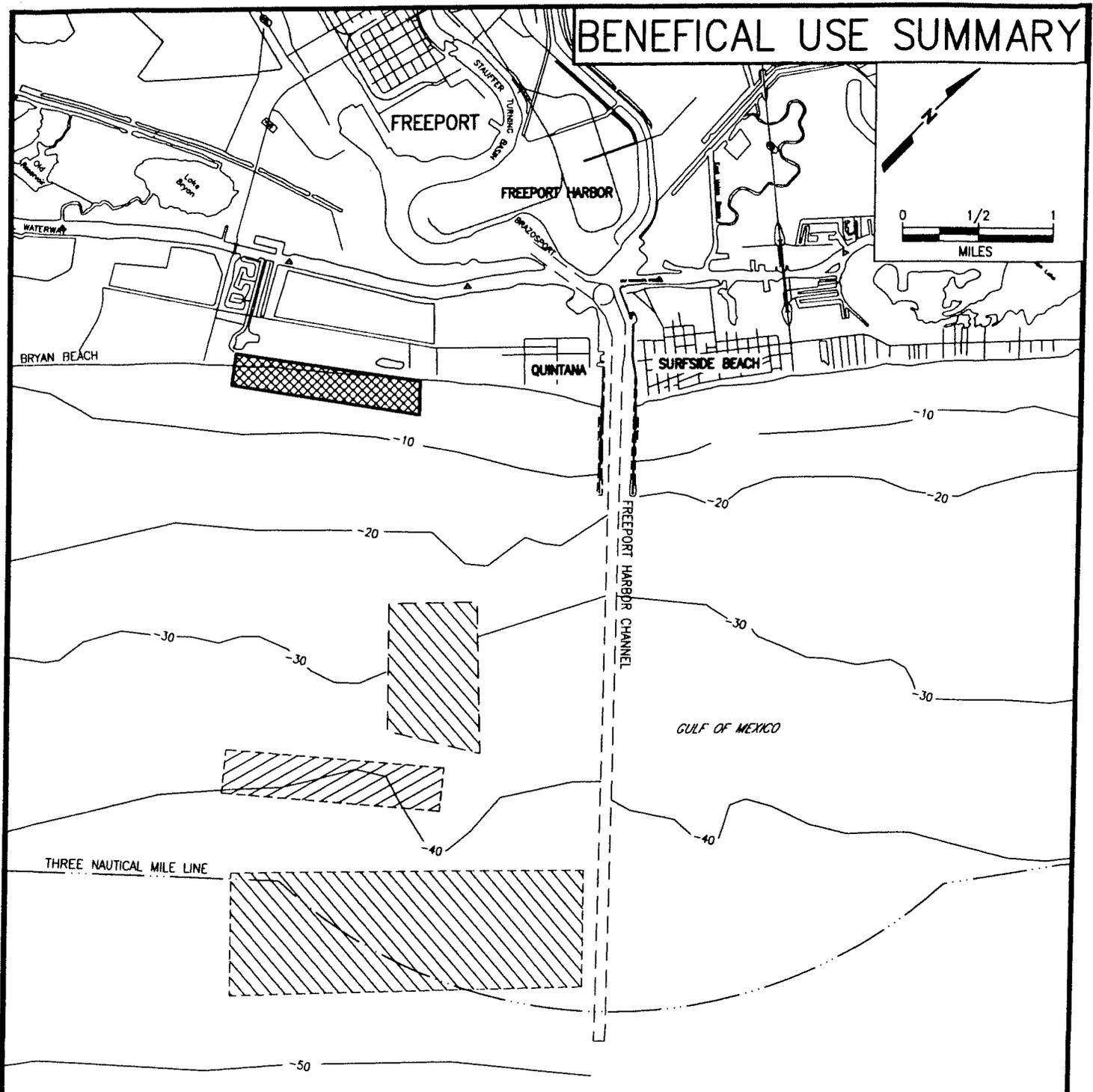
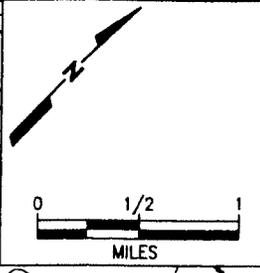
DATUM: USACE MLT

PROJECT No: 200.40142.00

SHEET 4 of 8

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# BENEFICIAL USE SUMMARY



**NOTES:**

- OFFSHORE BENEFICIAL USE AREA. CONSTRUCT A BERM OF TO PROVIDE HARD SUBSTRATE AND TO OFFER LIMITED BEACH PROTECTION. SEE SHEET 6 OF 8.
- BEACH QUALITY MATERIAL, IF FOUND IN ECONOMICALLY RECOVERABLE QUANTITIES, WILL BE USED AS BEACH NOURISHMENT FOR SURFSIDE BEACH. SEE SHEET 7
- EXISTING USACE DMPA

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**FOR COE USE ONLY**

Permit Application No.: \_\_\_\_\_

**APPLICANT:** BRAZOS RIVER HARBOR NAVIGATION DISTRICT    **COUNTY:** BRAZORIA

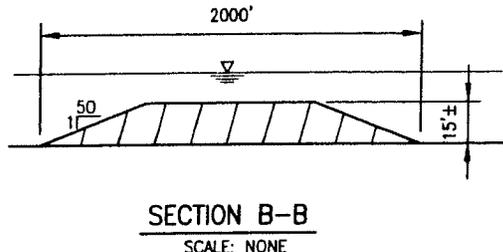
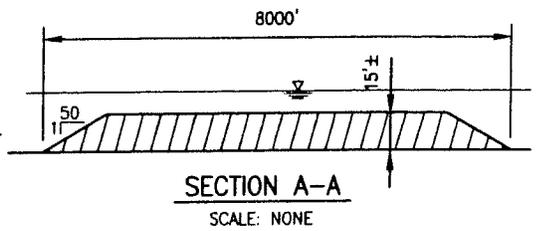
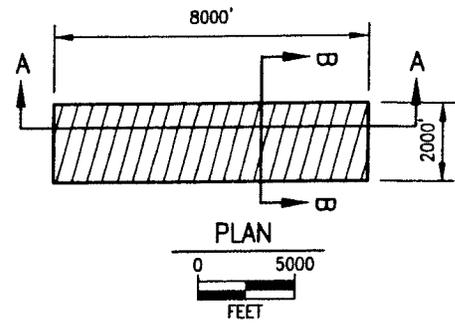
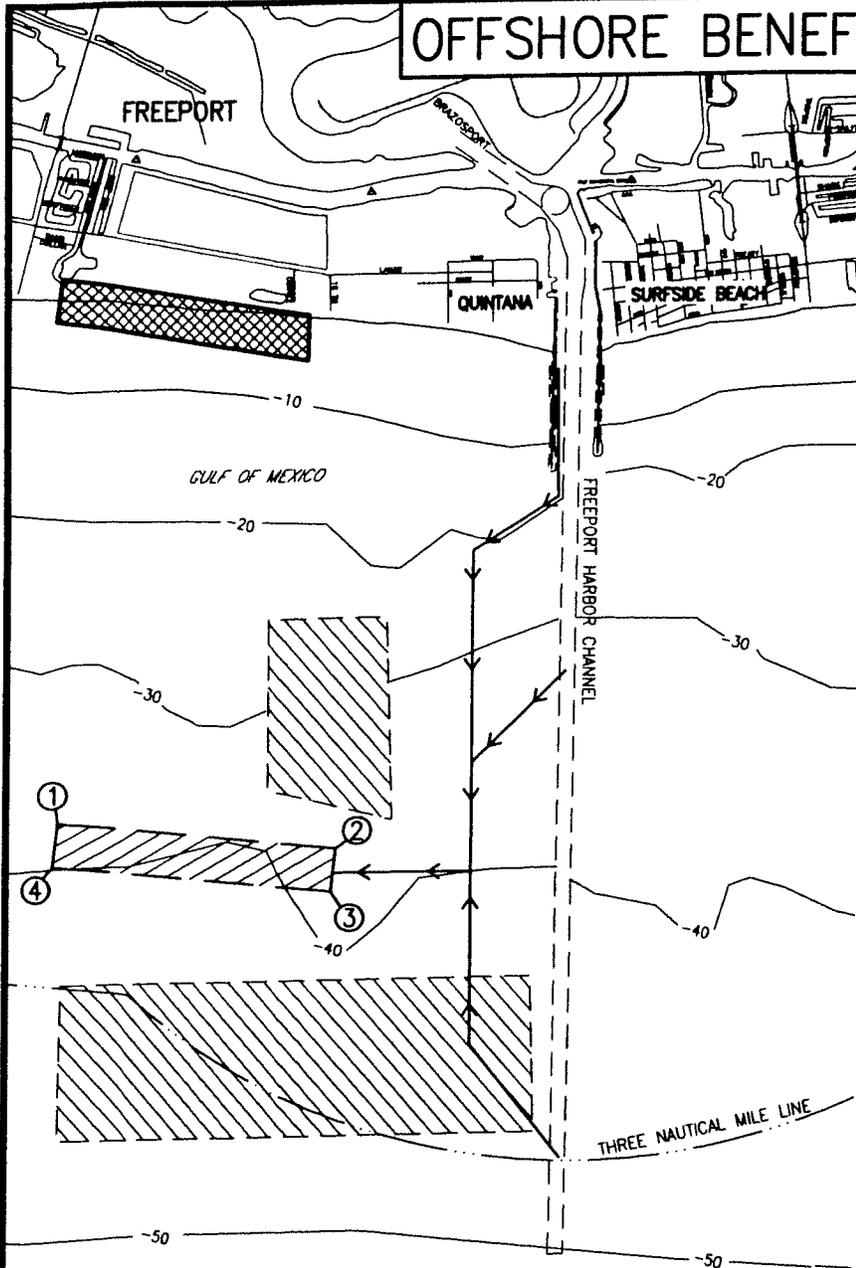
**PURPOSE:** WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

**DATE:** 4/15/05    **REV. DATE:**    **DATUM:** USACE MLT

**SHINER MOSELEY AND ASSOCIATES, INC.**  
ENGINEERS & CONSULTANTS  
555 North Carnacaba Street, Suite 1650 Corpus Christi, Texas 78478

**PROJECT No:** 200.40142.00    **SHEET** 5 of 8

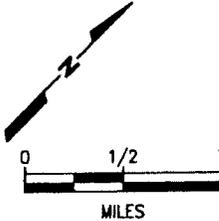
# OFFSHORE BENEFICIAL USE AREA—BERM



NOTES:

### LEGEND

-  PROPOSED BEACH NOURISHMENT
-  PROPOSED OFFSHORE BENEFICIAL USE AREA
- ① N28°53'05" W95°15'12"
- ② N28°53'54" W95°17'01"
- ③ N28°53'37" W95°16'48"
- ④ N28°52'48" W95°17'59"
-  EXISTING USACE OFFSHORE PLACEMENT AREAS
-  PIPELINE ROUTING (TYPICAL)



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FOR COE USE ONLY

Permit Application No.:

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT COUNTY: BRAZORIA

 SHINER MOSELEY AND ASSOCIATES, INC. ENGINEERS & CONSULTANTS

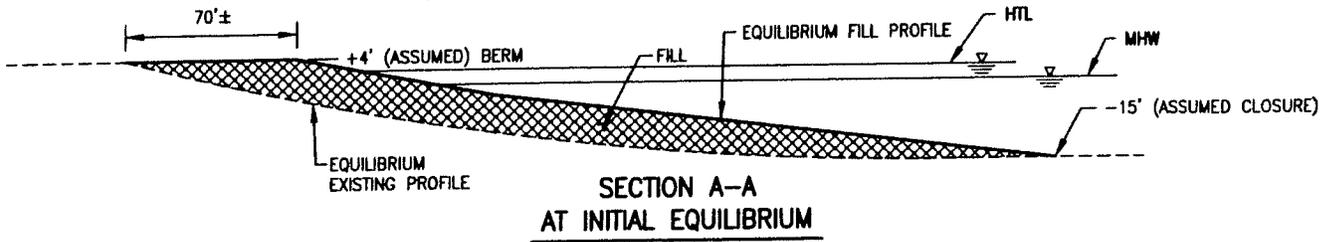
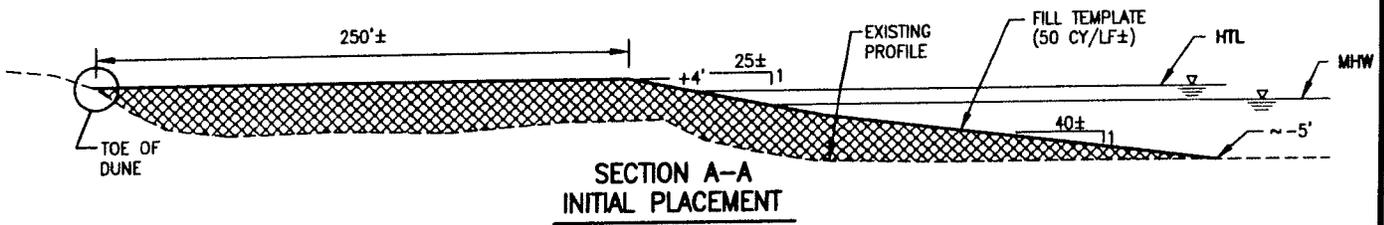
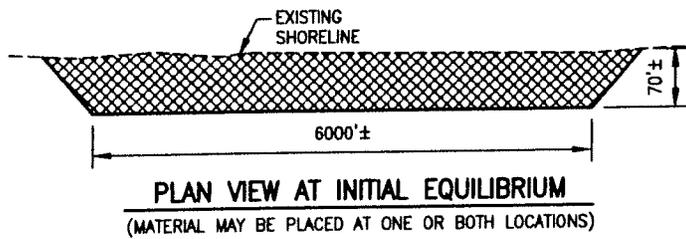
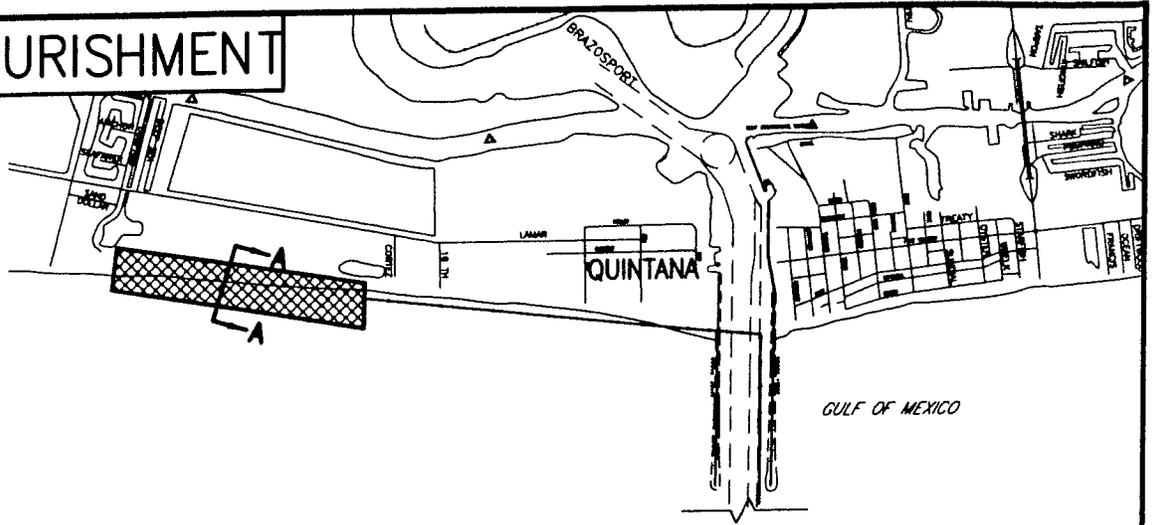
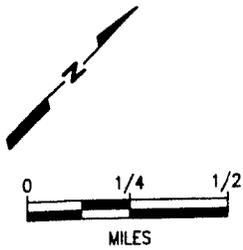
PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

555 North Carancahua Street, Suite 1650 Corpus Christi, Texas 78478

DATE: 4/15/05 REV. DATE: DATUM: USACE MLT

PROJECT No: 200.40142.00 SHEET 6 of 8

# BEACH NOURISHMENT



**NOTES:**

- MHW = 3.28 MLT; HTL = 5.01 MLT
- BEACH FILL LENGTH WILL DEPEND ON THE AMOUNT OF RECOVERABLE BEACH QUALITY MATERIAL; 300,000 CY WOULD CONSTRUCT APPROXIMATELY 6000 LF OF BEACH AT A FILL TEMPLATE OF 50 CY/LF. THIS WOULD CREATE APPROXIMATELY 9± ACRES OF BEACH AREA AT INITIAL EQUILIBRIUM.

**LEGEND**

- PROPOSED BEACH NOURISHMENT
- PIPELINE ROUTING (TYPICAL)



**FOR COE USE ONLY**

Permit Application No.: \_\_\_\_\_

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT	COUNTY: BRAZORIA
PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL	
DATE: 4/15/05	REV. DATE:
DATUM: USACE MLT	

555 North Caracabus Street, Suite 1650 Corpus Christi, Texas 78478

PROJECT No: 200.40142.00 SHEET 7 of 8

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## **ATTACHMENT E**

### **Adjacent Property Owners**

**Because of the large number of adjacent property owners, their names and addresses are being obtained from the Brazoria County Tax Appraisal District and are being supplied in electronic format under separate cover.**





June 7, 2005

J200.40142

Mr. Bryan Herczeg  
U.S. Army Corps of Engineers  
Galveston District  
P. O. Box 1229  
Galveston, Texas 77553-1229

**RE: PERMIT APPLICATION NO. 23752 (FREEPORT HARBOR CHANNEL  
WIDENING)**

Dear Mr. Herczeg:

We have reviewed your letter dated May 6, 2005 concerning additional information on the above permit application and the discussion with you and others on the USACE staff at the May 24 meeting; and have prepared this response.

The amendments to the permit application form and the revised permit application drawings are attached (Attachments A and B).

The remainder of this letter is a point by point response to the items raised in your May 6 letter.

- a. Complete and return the enclosed Consistency with Texas Coastal Management Program Form to the Galveston District.

*Completed TCMP Form attached. (Attachment C)*

- b. Submit coordinates for each corner of the beach nourishment site for historic property review.

*Sheet 7 modified to show coordinates.*

- c. Submit correct coordinates for the BU site. The coordinates of the proposed offshore BU site do not match the coordinates identified in the Scope of Work for the remote sensing survey for historic properties investigations.

*Sheet 6 modified to show proper coordinates.*

- d. Revise drawings on Sheet 3 of 8 as needed. The transition view shown does not match the plan view above. It also does not match the narrative found in section IV.1 Jetty Stability (page 6) of the project summary. The cross hatching on the upper slopes in the cut sections is not defined.

*Sheet 3 modified to reflect the appropriate stations.*

- e. Sheet 3 of 8, Section C-C shows a dredging area next to the jetty. Please explain.

*Sheet 3 modified to delete.*

- f. Sheet 3 of 8, match line should refer to sheet 4 not sheet 6.

*Sheet 3 modified to renumber the match line.*

- g. Sheet 4 of 8, legend shows proposed beach nourishment symbol but location of beach nourishment site is not identified on the plans.

*Sheet 4 modified to show beach nourishment location.*

- h. Sheet 6 of 8 of project plans, the use of pipelines for dredged material disposal 2 to 3 miles offshore is questioned.

*Although not common in the Galveston District, large pipeline dredges can effectively operate in the Gulf. For example, in Florida, pipeline dredges are frequently used up to 5 miles offshore for beach nourishment. In our discussions with dredging contractors concerning this project, the contractors raised the possibility of using pipeline dredges. In order to get the best price, we would like to maintain the flexibility of using either technology.*

- i. Provide the correct channel stations in both the project summary and plans including transition area, cross-sections and work limits. The description of the changes in channel dimensions found in section IV.1 Jetty Stability (first paragraph on page 6 of project summary) is unclear. Station 51+84 is identified as being at the Lower Turning Basin. This station is over 1000 feet seaward of the Coast Guard Station, not at the turning basin.

- *The proposed widening in the Jetty Channel is as follows:*

STATION	WIDEN TO
0+00 to 40+00	600 ft
40+00 to 45+00	Transition from 600 ft to 550 ft
45+00 to 63.35 (outer limits of turning basin)	550 ft

- *Sheet 3 has been modified to properly reflect the above.*
- *The Entrance Channel will be widened from 0+00 to -220+00*

- j. Identify the correct volume of dredged material. The volume of 2.8 MCY of dredged material in Section IV.2 Beneficial Use of Dredged Material (page 6 of the project summary) does not agree with the figure of 2.0 MCY found in the section I. Executive Summary (page 1) or under in the permit application (item 21).

*The total volume of dredged material that will be generated is 3.2 million CY. This includes widening the Jetty Channel at project depth of 45 feet and the Entrance Channel at project depth of 47 feet, both with 2 feet of advance maintenance and 2 feet of overdepth.*

- k. The most important engineering concern is that of jetty stability. Even if adequate stability is shown, it is noted that the top of cut will be approaching distances of 100 feet or less from the jetty toe and these areas will need to be monitored for possible undermining in the years to come.

*The routine cross sections obtained by the USACE to determine channel siltation will provide an indication of how the shelf between the top of the slope and the toe of the jetty may be changing due to erosion. We believe this should be adequate to detect any potential undermining. If the USACE believes additional monitoring will be required, it can be discussed as a possible permit condition.*

- l. the project summary and permit application state that a secondary benefit of the offshore berm (BU site) is to provide protection for the beach. To verify this, the hydrodynamic model must be reviewed. Submit the model and results for USACE review.

*A scoping level analysis of the potential reduction in wave energy on the Quintana Beach has been completed. That analysis concludes: "The berm is not likely to effectively reduce wave energy at the shoreline." Consequently, energy reduction will not be identified as a secondary benefit. A copy of the technical memo is included as Attachment D.*

- m. Although the permit application states the offshore berm (BU site) will primarily benefit fish, it does not indicate that biological monitoring will be conducted to demonstrate the intended purpose of the BU site.

*The applicant does not propose to do any biological monitoring of the offshore berm. Initial discussions with the resource agencies (NMFS and USFWS) indicated that they recognize the benefits. Also other Gulf studies (Mobile, Houston) have indicated the positive biological effect of berms. If this comes up during the public comment period, it can be discussed as a possible condition.*

- n. Address plans for future channel maintenance and identify where maintenance material will be placed.

*The Port intends to seek federal assumption of the maintenance of the non-federal widened increment. Until this occurs (if at all) the maintenance dredged material from the widening increment will be placed in the same offshore DMPA as the construction material.*

- o. Regarding impacts to sea turtles identify the dredging protocols to be used that are referred to in Section IV.4 of the Project Summary.

*The recognized protocols in effect at the time the dredging is performed, will be followed.*

- p. Submit the adjacent property owner addresses along the channel.

*See Attachment E.*

- q. The application is unclear whether or not the 300,000 CY of sandy material is in fact "economically recoverable". Determine if the sandy material is recoverable and if beach nourishment will be conducted if the project is authorized.

*At this point it is not possible to definitely determine whether or not the potential beach quality material will be "economically recoverable", since the specific dredging method is not established. In order to get the best price on the dredging, it is the applicant's intent to not specify the type of dredging equipment to be used. Thus, a contractor may bid the job based on using hopper dredge, pipeline dredge, mechanical methods or some combination thereof. The specific method used will determine the incremental cost of placing sand on the beach, which will establish its "economic feasibility", and this is not known at this time.*

- r. Regarding the Preliminary Geotechnical Study of Jetty Stability Report prepared by Fugro Consulting, April 2005:
  - 1. The soil parameters summarized on page 5-4 are not consistent with the parameter included in the slope stability analysis presented in Appendix B.
  - 2. Paragraph 5.5.3 on page 5-4 discusses the basis of how drained strength shear values were developed; however, this discussion does not address the presence of slickensided surfaces within the clays as noted on the drilling logs and how the presence of slickensided surfaces influence the selection of shear strength values.
  - 3. The selection of drained strength shear values is not consistent with Corps guidelines as provided in Section 2-2 of EM 1110-2-1902. These guidelines minimize the contribution of cohesion in the Mohr-Coulomb failure envelope for drained strength.
  - 4. Computed factors of safety in Table 5-2 on page 5-5 are uncharacteristically large for channel slopes cut in clay.

5. It is unclear what data was reviewed to evaluate the stability of existing channel slopes as noted on page 5-6. The Corps has an extensive history of cross section surveys taken through this reach. The data should be reviewed to further validate the appropriateness of 3:1 slopes.

*These issues were discussed in detail at the last meeting. They will be addressed in the final Jetty Stability Report.*

If we can provide any additional information, please contact us at any time.

Sincerely,

SHINER MOSELEY AND ASSOCIATES, INC.



Captain Thomas B. Rodino (USCG Retired)  
Senior Maritime Consultant



Joe C. Moseley, Ph.D., P.E.  
Principal

TBR/JCM/dd

- Attachments:
- A. Application Amendments
  - B. Revised Drawings
  - C. Consistency with TCMP Form
  - D. Potential Wave Energy Reduction Analysis
  - E. List of Adjacent Property Owners

cc: (w/ attachments) David Knuckey, P.E.  
Captain Kurt Hallier

**ATTACHMENT A**

Modify the information in the ENG Form 4345 to read as follows:

**18. Nature of Activity (Description of project, include all features)**

- Dredge channel to a maximum bottom width of 600 ft from the Lower Turning Basin to the -51 ft contour, a distance of approximately 4.8 miles.
- Dredging will be performed primarily with pipeline dredge; a hopper dredge, mechanical methods, or some combination thereof.

**21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards**

Clay / silty clay .....2,400,000 CY  
Sand / sandy silt.....800,000 CY  
Total .....3,200,000 CY

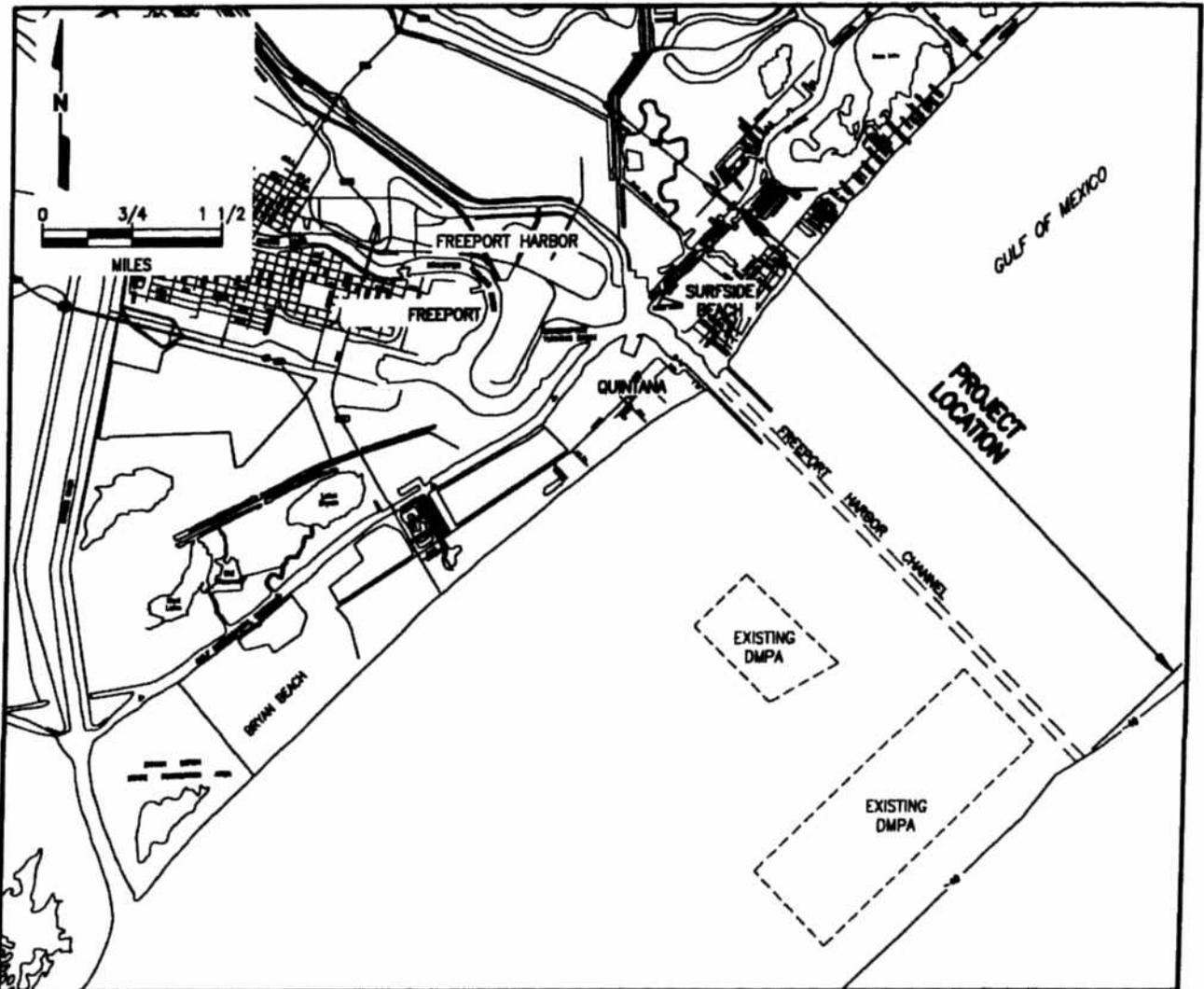
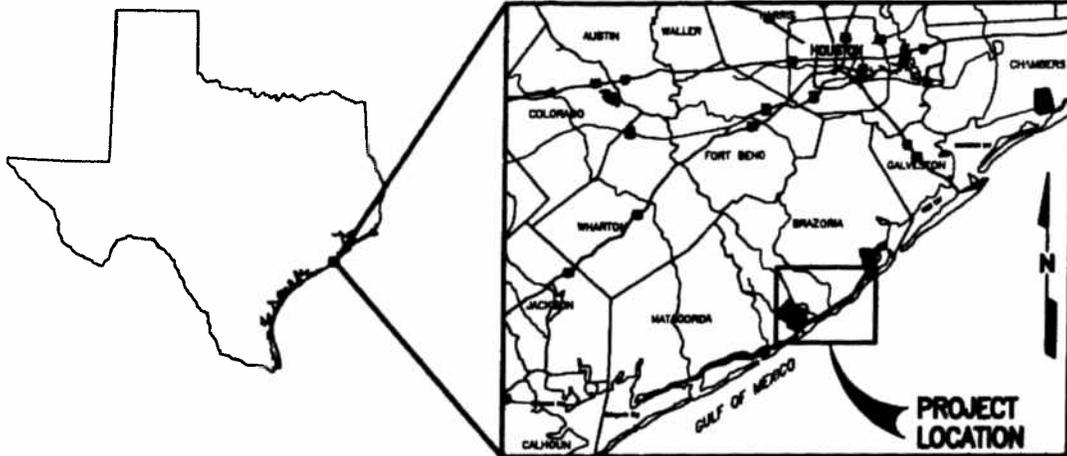
**24. Addresses of Adjoining Property Owners, Lessees, etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list.)**

See attached list (Attachment D)

**ATTACHMENT B**

**Revised Permit Drawings**

# PROJECT LOCATION



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Permit Application No.:

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT COUNTY: BRAZORIA

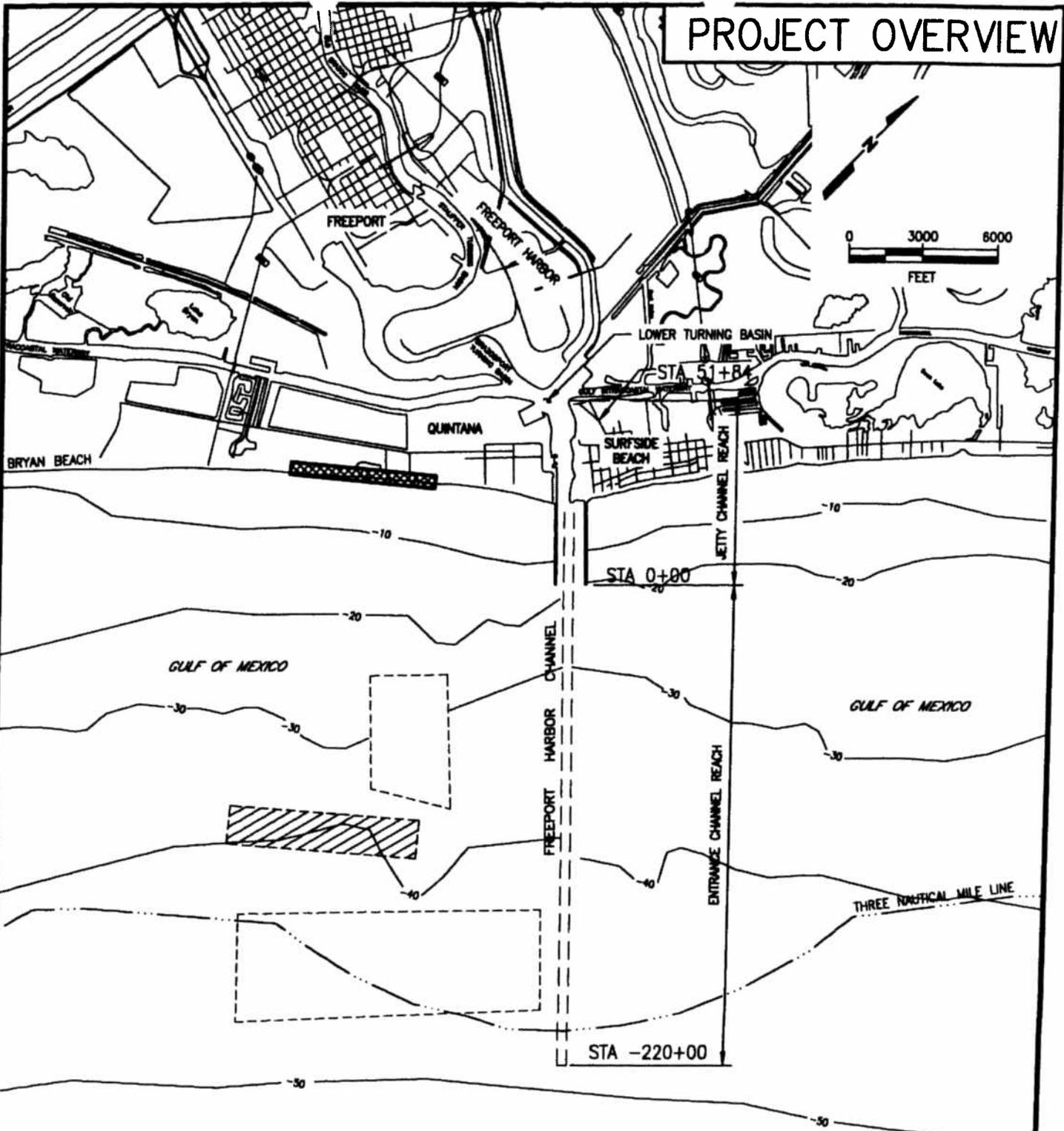
**SM** SHINER MOSELEY AND ASSOCIATES, INC. ENGINEERS & CONSULTANTS  
555 North Comanche Street, Suite 1658 Corpus Christi, Texas 78478

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

DATE: 6/07/05 REV. DATE: DATUM: USACE MLT

PROJECT No: 200.40142.00 SHEET 1

# PROJECT OVERVIEW



**LEGEND:**

-  PROPOSED NEW BENEFICIAL USE AREA: BERM FOR HABITAT
-  PROPOSED BEACH NOURISHMENT AS BENEFICIAL USE
-  EXISTING USACE DMPA



FOR COE USE ONLY

Permit Application No.:

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT COUNTY: BRAZORIA



SHINER MOSELEY AND ASSOCIATES, INC. ENGINEERS & CONSULTANTS

353 North Cameron Street, Suite 1630 Corpus Christi, Texas 78478

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

DATE: 6/07/05

REV. DATE:

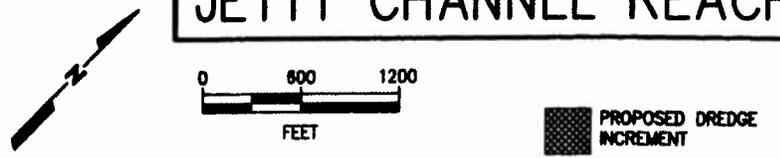
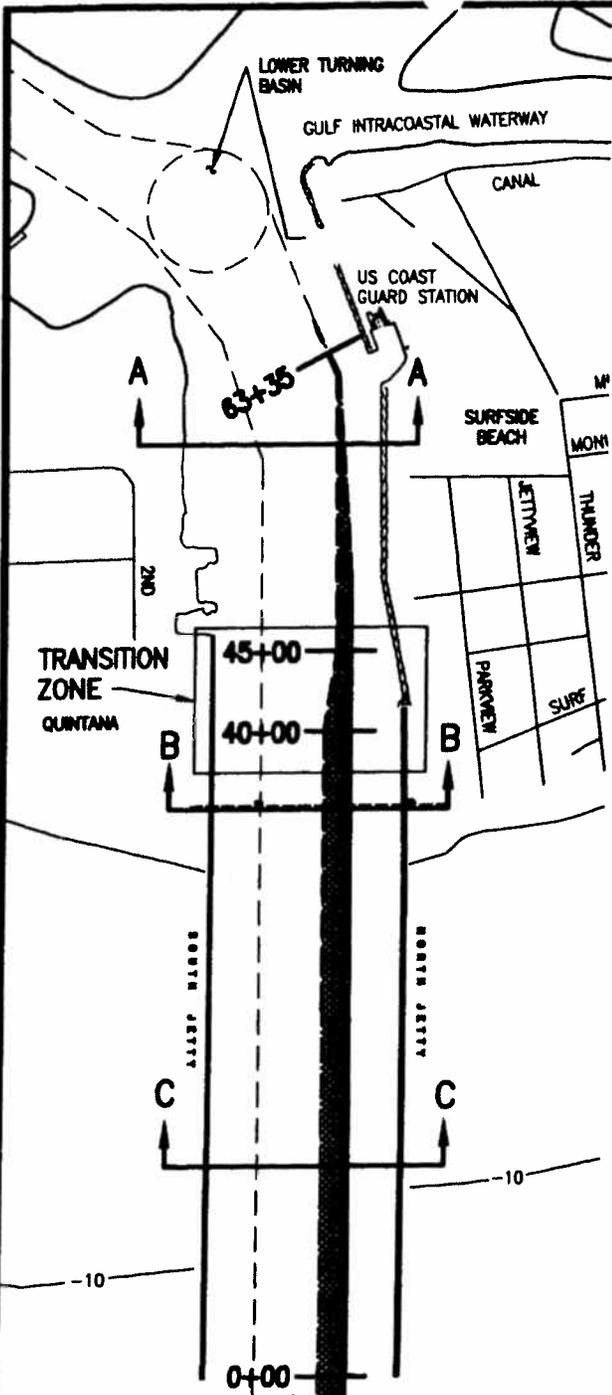
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PROJECT No: 200.40142.00

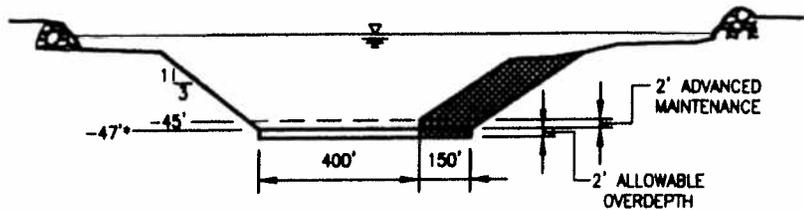
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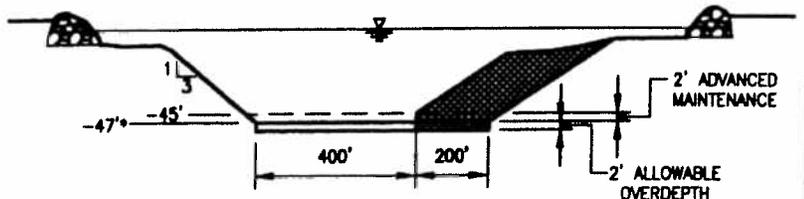
# JETTY CHANNEL REACH



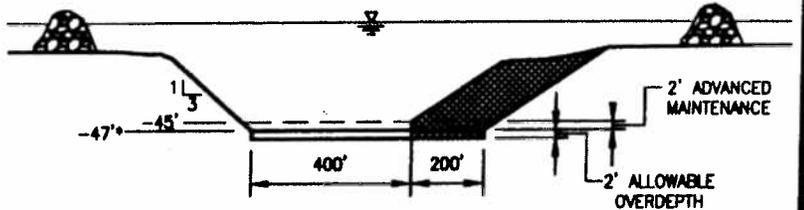
**PROPOSED DREDGE INCREMENT**



**SECTION A-A**

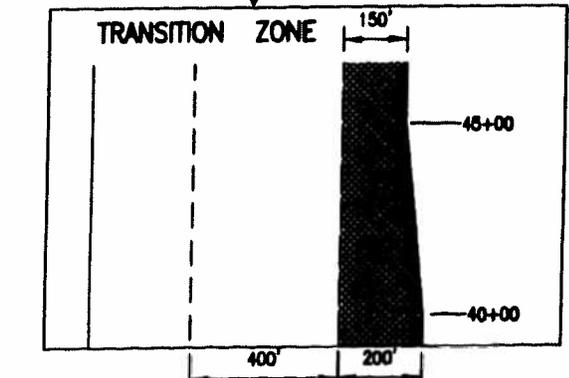


**SECTION B-B**



**SECTION C-C**

\* BASED ON -45' PLUS 2' ADVANCED MAINTENANCE



JETTY CHANNEL WIDENING SUMMARY	
REACH	WIDEN TO
0+00 TO 40+00	600 FT.
40+00 TO 45+00	TRANSITION FROM 600 FT. TO 550 FT.
45+00 TO 63+35	550 FT.

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**FOR COE USE ONLY**  
Permit Application No.:

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT COUNTY: BRAZORIA

**SHINER MOSELEY AND ASSOCIATES, INC.**  
ENGINEERS & CONSULTANTS  
555 North Comanche Street, Suite 1600 Corpus Christi, Texas 78478

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

DATE: 6/07/05

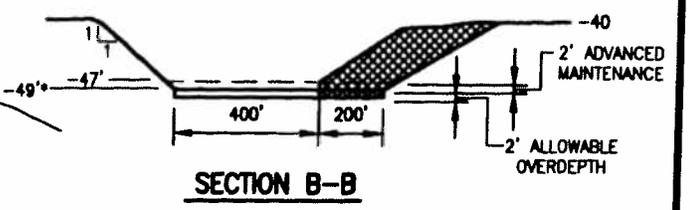
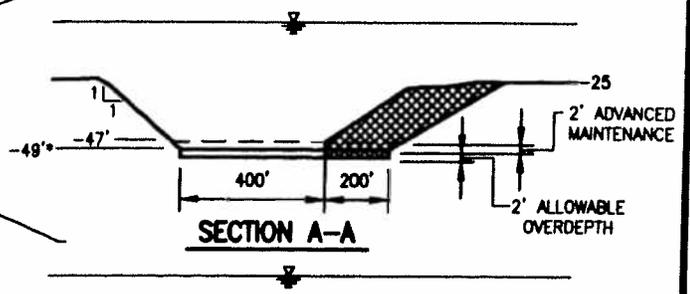
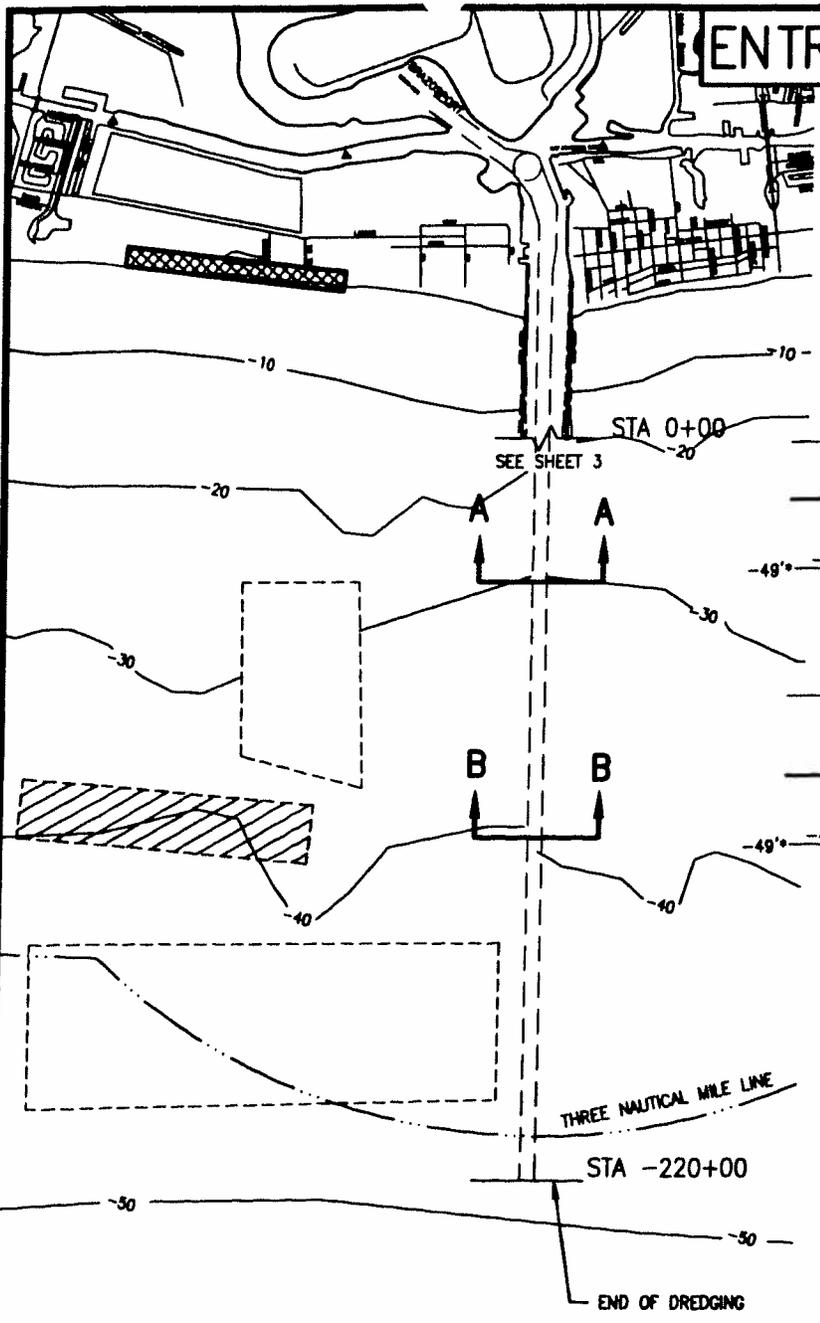
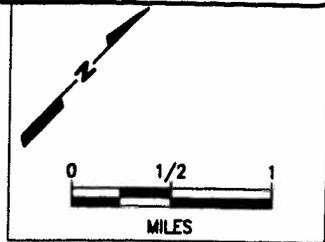
REV. DATE:

DATUM: USACE MLT

PROJECT No: 200.40142.00

SHEET 3

# ENTRANCE CHANNEL REACH



\* BASED ON -47' PLUS 2' ADVANCED MAINTENANCE

**NOTES:**

\* INCLUDES 2' OF ADVANCED MAINTENANCE PLUS 2' OF ALLOWABLE OVERDEPTH

**LEGEND:**

- PROPOSED DREDGE INCREMENT
- PROPOSED NEW BENEFICIAL USE AREA: BERM FOR HABITAT (SEE SHEET 8)
- PROPOSED BEACH NOURISHMENT AS BENEFICIAL USE (SEE SHEET 7)
- EXISTING USACE DMPA



FOR COE USE ONLY  
Permit Application No.:

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT COUNTY: BRAZORIA

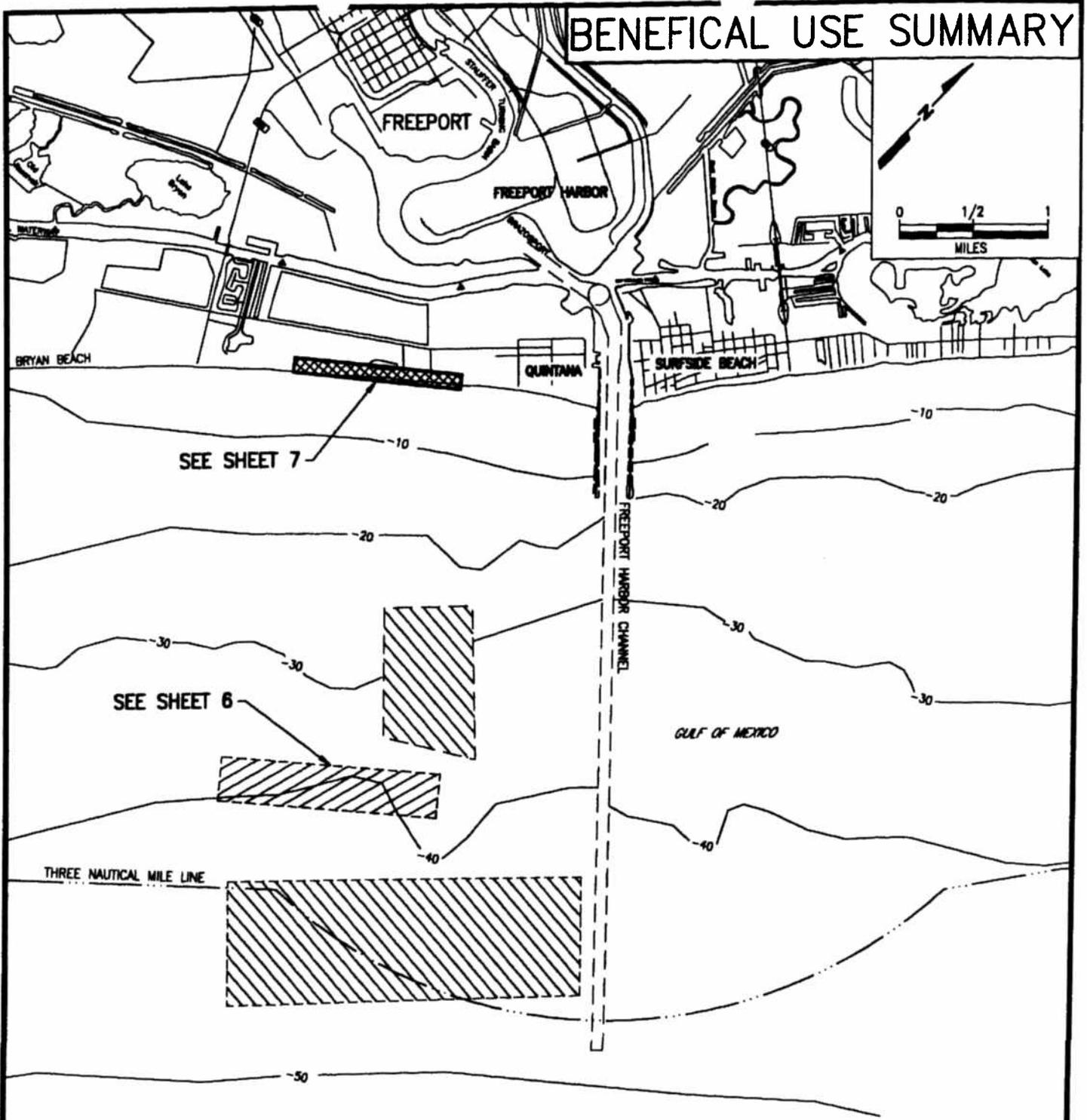
**SHINER MOSELEY AND ASSOCIATES, INC.**  
ENGINEERS & CONSULTANTS  
555 North Carvers Lane Street, Suite 1650 Corpus Christi, Texas 78478

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

DATE: 6/07/05 REV. DATE: DATUM: USACE MLT PROJECT No: 200.40142.00 SHEET 4

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# BENEFICAL USE SUMMARY



SEE SHEET 7

SEE SHEET 6

**NOTES:**

 OFFSHORE BENEFICIAL USE AREA. CONSTRUCT A BERM OF TO PROVIDE HARD SUBSTRATE AND TO OFFER LIMITED BEACH PROTECTION. SEE SHEET 6.

 BEACH QUALITY MATERIAL, IF FOUND IN ECONOMICALLY RECOVERABLE QUANTITIES, WILL BE USED AS BEACH NOURISHMENT FOR QUINTANA BEACH. SEE SHEET 7

 EXISTING USACE DMPA



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Permit Application No.: \_\_\_\_\_

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT COUNTY: BRAZORIA

 SHINER MOSELEY AND ASSOCIATES, INC. ENGINEERS & CONSULTANTS  
555 North Comanche Street, Suite 1620 Corpus Christi, Texas 78478

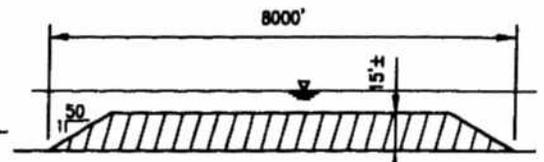
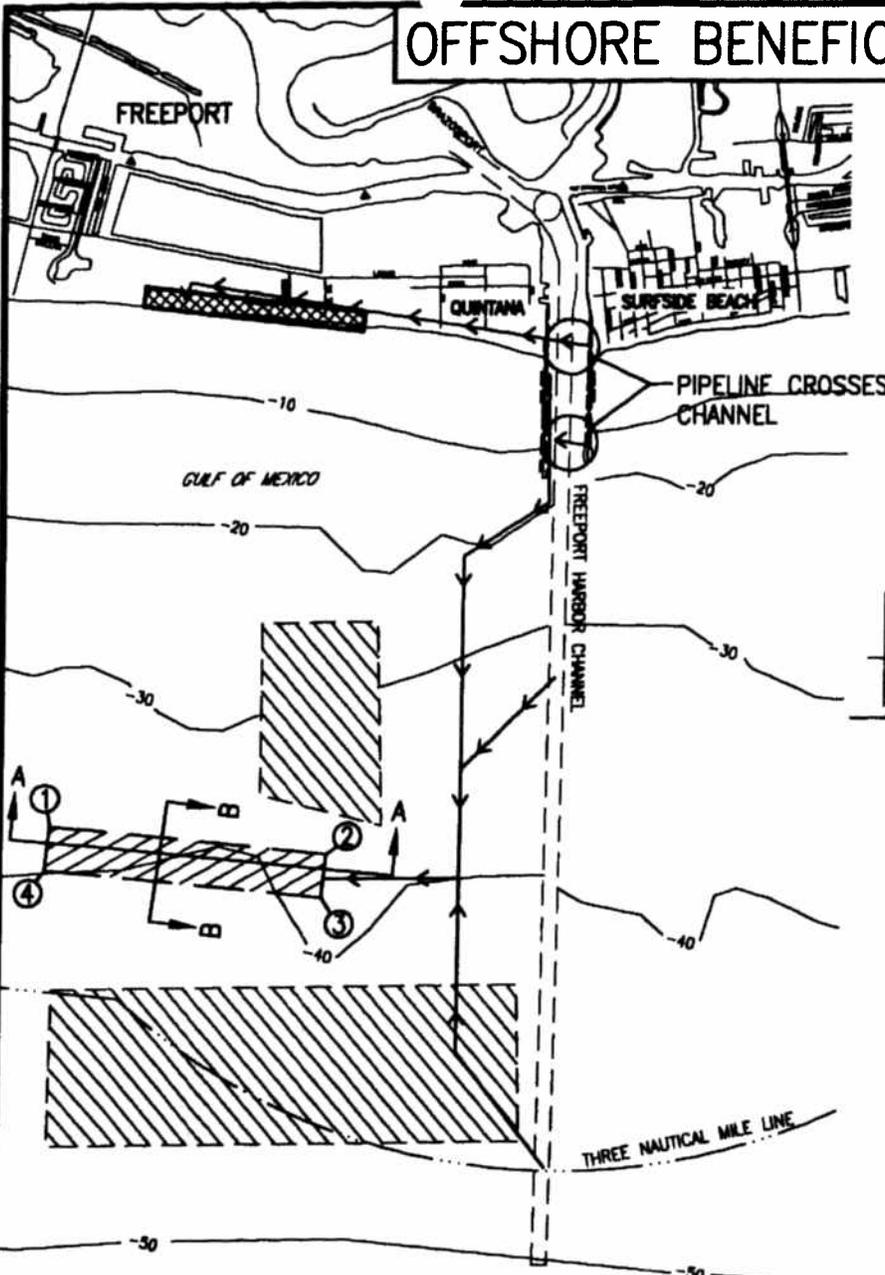
PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

DATE: 6/07/05 REV. DATE: \_\_\_\_\_ DATUM: USACE MLT

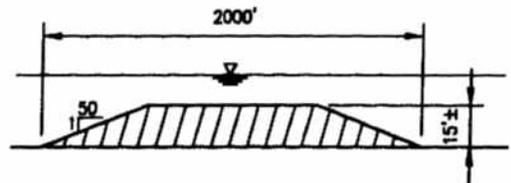
PROJECT No: 200.40142.00 SHEET 5

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# OFFSHORE BENEFICIAL USE AREA-BERM



**SECTION A-A**  
SCALE: NONE



**SECTION B-B**  
SCALE: NONE

**NOTES:**

PIPELINE ROUTE OUTSIDE JETTY IS TO SHOW CONCEPT. IT WILL VARY IN LOCATION AS REQUIRED FOR EFFICIENT DREDGING.

**LEGEND**

- PROPOSED BEACH NOURISHMENT
- PROPOSED OFFSHORE BENEFICIAL USE AREA
- ① N 28.52899967 W 95.18200007
- ② N 28.53800000 W 95.16900000
- ③ N 28.53600000 W 95.16700000
- ④ N 28.52700000 W 95.18000000
- EXISTING USAGE OFFSHORE PLACEMENT AREAS
- PIPELINE ROUTING (TYPICAL)



FOR COE USE ONLY

Permit Application No.: \_\_\_\_\_

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT COUNTY: BRAZORIA

SHINER MOSELEY AND ASSOCIATES, INC. ENGINEERS & CONSULTANTS

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

353 North Comanche Street, Suite 1600 Corpus Christi, Texas 78478

DATE: 6/07/05

REV. DATE:

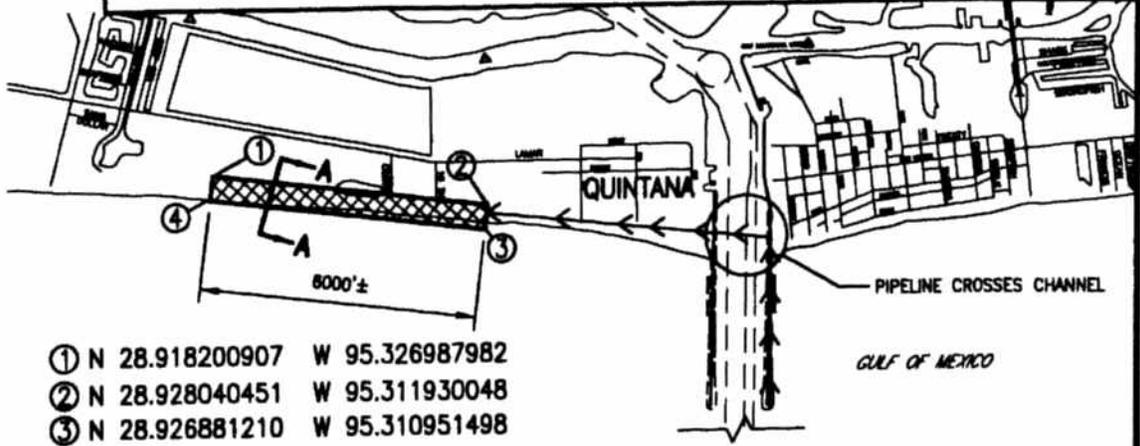
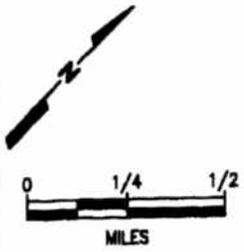
DATUM: USACE MLT

PROJECT No: 200.40142.00

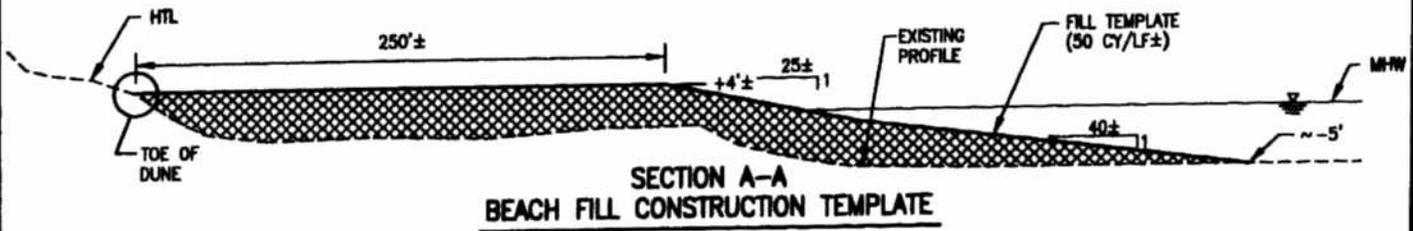
SHEET 6

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# BENEFICIAL USE BEACH NOURISHMENT



- ① N 28.918200907 W 95.326987982
- ② N 28.928040451 W 95.311930048
- ③ N 28.926881210 W 95.310951498
- ④ N 28.917041777 W 95.326009356



**NOTES:**

1. MHW = APPROX. +3.3' MLT; HTL = APPROX. +5.0' MLT
2. BEACH FILL LENGTH WILL DEPEND ON THE AMOUNT OF RECOVERABLE BEACH QUALITY MATERIAL THAT MIGHT BE AVAILABLE; IF 300,000 CY IS AVAILABLE, IT WOULD CONSTRUCT APPROXIMATELY 6000 LF OF BEACH AT A FILL TEMPLATE OF 50 CY/LF. THIS WOULD CREATE APPROXIMATELY 9± ACRES OF BEACH AREA AT INITIAL EQUILIBRIUM.

**LEGEND**

- PROPOSED BEACH NOURISHMENT
- PIPELINE ROUTING (TYPICAL)



FOR COE USE ONLY

Permit Application No.:

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT COUNTY: BRAZORIA

SHINER MOSELEY AND ASSOCIATES, INC. ENGINEERS & CONSULTANTS  
555 North Comstock Street, Suite 1650 Corpus Christi, Texas 78478

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

DATE: 6/07/05

REV. DATE:

DATUM: USACE MLT

PROJECT No: 200.40142.00

SHEET 7

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ATTACHMENT C

CONSISTENCY WITH THE TEXAS COASTAL MANAGEMENT PROGRAM

The applicant should sign this statement and return with application packet to:

U.S. Army Corps of Engineers (USACE)
Regulatory Branch
P.O. Box 1229
Galveston, Texas 77553-1229
Fax: 409-766-3931

For USACE use:
Permit #:
Project Mgr:

Applicant's Name and Address (please print):

Brazos River Harbor Navigation District

The Texas Coastal management Program (CMP) coordinates state, local, and federal programs for the management of Texas coastal resources. Activities within the CMP boundary must comply with the enforceable policies of the Texas Coastal Management Program and be conducted in a manner consistent with those policies.

The proposed activity must not adversely affect coastal resource areas (CNRAs). CNRAs include: coastal barriers, coastal historic areas, coastal preserves, coastal shore areas, coastal wetlands, critical dune areas, critical erosion areas, gulf beaches, hard substrate reefs, oyster reefs, special hazard areas, submerged lands, submerged aquatic vegetation, tidal sand or mud flats, waters of the open Gulf of Mexico, and waters under tidal influence.

The applicant affirms that the proposed activity, its associated facilities, and their probable effects comply with the relevant enforceable policies of the Texas Coastal Management Program (see 31 TAC §501.14), and that the proposed activity will be conducted in a manner consistent with such policies for the following reasons (use additional pages if necessary):

- 1. The proposed widening is of an existing ship channel and is being done to more efficiently handle both existing and future ship traffic.
2. The dredging and material placement is being done in a manner to eliminate or minimize any adverse impact. In fact, the dredged material will be devoted to beneficial use purposes. The primary beneficial use will be to construct an offshore berm to provide hard substrate for aquatic species. To the extent that suitable beach quality material is found in economically recoverable quantities, it will be used for nourishment of nearby eroding beaches.

Date: June 7, 2005 Signature: Joe C Mosley

Any questions regarding the Texas Coastal Management Program should be referred to:

Gwen Spriggs
Texas General Land Office
Coastal Coordination Council
1700 North Congress Avenue, Room 620
Austin, Texas 78701-1495
Phone: 512-475-3514
Fax: 512-475-0680
Toll Free: 1-800-998-4GLO
gwen.spriggs@glo.state.tx.us

Permitting Assistance Coordinator
Permit Service Center
6300 Ocean Drive
TAMU-CC Natural Resource Center, Suite 2800
Corpus Christi, Texas 78412-5599
Phone: 361-825-3050
Fax: 361-825-3465
Toll Free: 1-866-894-3578
permitting.assistance@glo.state.tx.us

ATTACHMENT D



SHINER MOSELEY AND ASSOCIATES, INC.  
ENGINEERS & CONSULTANTS

MEMORANDUM

6/7/2005

J200.40142

TO: FILE

FROM: JOE C. MOSELEY, PH.D., P.E. *JCM*  
JOEL DARNELL *JD*

RE: FREEPORT CHANNEL WIDENING

**Executive Summary**

- A scoping level investigation was performed to assess the potential for the offshore berm to reduce wave energy (and thereby erosion) on the beach at Quintana. This analysis was based on the berm location and size shown in the permit application (No. 23752, Sheet 6).
- The analysis used idealized data on bathymetry, wave conditions, and berm geometry that were obtained from multiple government sources (USACE, NOAA).
- Three wave cases were analyzed: ambient (H=3.5 ft), moderate storm (H=13.0 ft), and hurricane (H=20.0 ft).
- Due to the water depth and height of the berm, most waves will propagate over the berm with an insignificant change in height. Therefore, the berm is not likely to effectively reduce wave energy at the shoreline.

**Introduction**

This memo summarizes a scoping level investigation to assess the impacts of the proposed offshore dredged material berm located in the vicinity of the Freeport Channel, Freeport, TX. This work was performed in four phases: wave climate study, bathymetric grid creation, REFDIF wave modeling, and data analysis and interpretation. Given the proposed berm geometry and location in relatively deep water, the results of this investigation suggest that waves at the site are unlikely to be significantly effected, even for moderate storm conditions. It is important to note that the results of this investigation are based on idealized bathymetry, wave conditions, and berm geometry and thus should be considered a qualitative assessment. A more detailed and extensive modeling effort may provide better insight into the wave and shoreline processes at the site.

### Wave Climate Study

To establish representative wave conditions at the site, a 20-year record of hindcast wave data distributed by the USACE Coastal and Hydraulics Laboratory Wave Information Study (WIS) was compiled. These hindcast data were supplemented with limited study of offshore wave buoy data available from the National Data Buoy Center (NDBC). From these sources, nearshore wave height, period, and direction were established for ambient conditions at the site. Compiled WIS hindcast data were used to estimate representative wave conditions during moderate storms, as well as mild tropical storms and hurricanes. To quantify the relative occurrence of extreme events, a simple return period analysis was also performed for wave height, based on WIS monthly maximum hindcast wave conditions. Table 1 provides the three wave cases and associated wave conditions used in the wave modeling. Wave direction is reported using the meteorological convention (direction from which the wave propagates).

Table 1. Summary of wave conditions.

Case	$H_{mo}$ (ft)	$T_p$ (s)	Direction
Ambient	3.5	5.5	146°
Moderate Storm	13.0	10.0	165°
Tropical Storm/Hurricane	20.0	20.0	136°

### Bathymetric Grid Creation

Since waves in the nearshore respond to changes in bathymetry, a representative bathymetric grid of the Freeport Channel and vicinity was generated. Lacking detailed hydrographic survey information, this idealized bathymetric grid was generated primarily from NOAA Navigation Chart 11321. Some of the features from this chart were adjusted to make the beach slope more uniform across the modeling domain. For reference, NGDC Coastal Relief Model soundings appear to contain anomalous data in the immediate vicinity of the Freeport Channel, particularly in offshore areas south of the jetties.

The idealized dredged material berm was represented as a three dimensional trapezoid with base length of 8200 ft, width of 1950 ft, and height of 7 ft. The berm was oriented roughly parallel to the shoreline contours in a water depth of about 40 ft. Side slopes of the berm were set at 50:1. The widened Freeport Channel and existing jetties were also built into the bathymetric grid, though these features did not play an important role in the modeling exercise.

Two bathymetric grids were generated, one with idealized bathymetry only, and the other including both the idealized bathymetry and berm geometry described above. Each grid covered 21,300 ft alongshore, with an offshore extent of 20,000 ft, and grid resolution of 50 ft.

### **REF/DIF Wave Modeling**

REF/DIF 1 was applied to model wave transformation for the three wave cases and two bathymetric grids described above. REF/DIF is a weakly non-linear numerical model for propagation of monochromatic water waves over complex bathymetry and includes important nearshore wave processes such as shoaling, refraction, diffraction, and energy dissipation. REF/DIF has been applied to numerous modeling projects near jetties and entrance channels and can account for complex features such as emergent breakwaters or submerged mounds. Water level for all model runs was selected to represent mean sea level at the site.

### **Analysis and Interpretation**

The model output included wave height and direction, which were compared between wave cases with and without the offshore berm in place. Due to the water depth and height of the berm relative to wave length, most waves can be expected to propagate over the offshore berm with an insignificant change in height. The modeling suggests that the primary effect of the berm may be diffractive scattering and focusing of waves on either end of the berm. For the monochromatic waves used in this investigation, this diffractive pattern was the most pronounced difference between cases with and without the berm in place. Still, these differences appeared small and would be even less pronounced considering the reality of ocean waves, which occur in a range of frequencies, directions, and wave heights at any given time. Furthermore, the relatively sharp gradients of the idealized berm shape generate more pronounced focusing and scattering effects than would be observed in the field for an actual offshore berm. For the results described above, adding storm surge to the model would only lessen the impacts of the offshore berm, by increasing the water depth. Therefore, the effect of storm surge was not analyzed in detail.

### **Conclusion and Recommendations**

Based on the interpretation of model results discussed here, an offshore berm with relatively small height in deep water is not likely to effectively reduce wave energy at the shoreline, even for moderate storm conditions. More extensive wave modeling that accounts for wave spectra and wave reflection may provide additional insight into potential offshore berm effects on wave energy. Modeling should also investigate the effects of different berm geometries and locations, other than the single idealized case considered here.